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PLANT-BREEDING.—II.

[By A. H. Cockayne, Biologist.]

THE SWEDISH ENTERPRISE.

The station for plant-breeding at Svalöf, Sweden, is so important an institution, and has had and is having such a far-reaching effect on Swedish agriculture, that an outline of its history and work will be interesting, particularly in connection with the suggestions made in the previous article (*Journal*, September, p. 234) regarding the establishment of a plant-breeding station in New Zealand.

The object of the Svalöf Station is the development by systematic breeding and selection of new, better, and more productive varieties of agricultural plants. So far attention has been confined to the improvement of wheat, oats, rye, barley, peas, and vetches, and latterly the improvement of forage-plants.

The institution is the outcome of private enterprise, and owes its origin to the farsightedness and liberality of Mr. B. Welinder, a wealthy landowner of the province of Schonen. Mr. Welinder became convinced, through his travels in Germany and England, of the importance to agriculture of cultivating the best varieties of cereals, and in 1884 or thereabouts he imported into South Sweden and grew on his own estate a number of different foreign varieties of grain. Among this number was the Scottish variety of wheat known as Square Head. Mr. Welinder distributed seed of this Scottish sort

among his neighbours, who discovered upon growing it that with the same amount of labour they were harvesting nearly 2,000 kg. per hectare of this new variety, instead of 1,200 kg., the ordinary yield of wheat. The success of this introduction, together with other arguments, induced Mr. Welinder to form in 1886 the South Swedish Society for the Breeding and Selection of Seeds. In this he was heartily seconded by Freiherr F. G. Gyllenkrook and other large landowners of the province of Schonen. The object of this society was to raise the standard of Swedish agriculture through the introduction and origination of better varieties of grain and forage-plants. In connection with the society, and the breeding-station which was the outcome of it, there was established in 1891 a seed company, which at present is capitalized at £20,000. This company is a business concern for the purpose of growing in large quantities and distributing advantageously and economically seeds of the cereals and fodder-plants which have been originated or tested by the breeding-station, and proved of special agricultural value. In the early years of the breeding society the attempt was made to combine these two related objects, but it was found that too much time of the plant-breeders was absorbed in the purely business transactions of selling and shipping seed.

The effort of Mr. Welinder and his associates soon attracted attention in other parts of Sweden, and resulted in the formation of the General Swedish Breeding Society, which later, by absorption of smaller institutions in middle Sweden, became the Swedish Seed-breeding Society, with headquarters at Svalöf.

Although owing its origin to private initiative, the association has received since 1891 an annual Government appropriation: £2,000 a year is the amount annually expended on the station.

Until recently the business relations between the association and the company have been somewhat complicated. Seeds of new varieties originated by the breeding-station have been appraised by a joint committee and sold outright to the company. Under the present arrangement the society receives a royalty of 1 per cent. of the gross receipts of the company on the sales of seed originated by the breeding-station.

From 1886 to 1892, unproductive methods of selection were employed, and not a single really superior variety of grain was developed. Since 1892, when Director N. H. Nilsson introduced an original method of selection which has proved very important, several new and valuable sorts have been distributed on a large scale, and many other promising ones are on trial. As it required about five years to grow a sufficiently large quantity of the seed to justify putting it on the market, it was not until 1897 that the

company could really begin to get any benefit from the work of the plant-breeders.

Upon receiving seed of a new and thoroughly tested variety from the breeding-station, the company sows it at once on its own land, which is adjacent to the grounds of the station; and when a sufficiently large quantity has been harvested the company distributes it to correspondents, under the simple agreement that the latter shall sell the whole crop harvested from this seed to the company, receiving for their extra pains a price somewhat in advance of the market price for ordinary grains. No special precautions are considered necessary to prevent the grower from appropriating a small quantity for his own use and subsequent sale. So much depends upon the inspection of the growing grain and harvested product, and the certificate furnished by the breeding-station, that Swedish farmers evidently prefer to pay the extra price charged for the certified seed. Throughout both Sweden and Finland the Svalöf varieties of grain are spoken of in the highest terms, and the new Svalöf varieties are rapidly ousting all the present-day standard kinds, owing to their greater reproductive powers. Thus the average yield of cereal crops is steadily rising in Sweden, and the gain to the growers can already be estimated at hundreds of thousands of pounds sterling annually.

The seed company carries in stock a limited number of standard seed varieties that have not been bred at the Svalöf station. These are, however, all subjected to inspection by the experts of the station, and every sack of seed sold by the company bears the stamp of the society, and contains a certificate as to its purity. All pedigreed grains which are purchased by the company from its correspondents must before purchase be inspected in the field, and officially recommended by an expert of the breeding-station.

The breeding-station of Svalöf possesses a modern laboratory of attractive exterior and conveniently arranged interior, and is surrounded by a small neatly kept park. The experimental plots, of which there are more than two thousand, are scattered among the larger fields of pedigreed grain, and cover in all about 25 acres.

Special stress is laid by Dr. Nilsson upon the fact that all of its experimental plots are under as nearly as possible natural conditions, and, to insure still further accuracy, each variety is tested on not less than three different plots.

The work of the station naturally runs along two lines—*i.e.*, the search for mother-plants for starting new varieties, and the elimination of all but the very best of the varieties started.

All selection of mother-plants is based upon (1) the general qualities of the plant itself, (2) its ability to produce plants of high average quality,

and (3) its ability to produce plants of nearly absolute uniformity in botanical characters.

As soon as one of the plants seems to warrant it—*i.e.*, when its uniformity of type and general excellence of yield have been demonstrated—a number of the best-yielding plants, excepting, of course, the single best one, are chosen to plant an increase plot. From the seed obtained from this increase plot, providing the uniformity of type and general excellence still hold good, the variety-test plots are planted. Here is applied the third and final test, and all but the one or two very best are eliminated. The variety or varieties that hold out through all this process of selection are increased for distribution. The method of selection outlined has been in use at Svalöf since 1892.

Although directly productive of no novelties, the early years of activity were not lost, for they resulted in the discovery of numerous valuable methods and instruments for correctly appraising the practical value of certain characters of cereal and fodder plants. They made it possible for the investigator to express, often in statistical form, the value of a variety of grain.

The amateur plant-breeder is often blinded to the real problem at issue by the ease with which a host of new forms can be produced by cross-fertilization. He learns later, as Dr. Nilsson says, that it is easy enough to produce new varieties, but far more difficult to determine which of their characteristics are worth reproducing, or can be reproduced. When Dr. Nilsson hit upon the idea of conducting all experiments from the standpoint of a single plant, he was able with the aid of the experience of former years to correctly and quickly decide the value of such new varieties as he observed and selected from his fields. He was able by the same means to select from each following generation the desirable type for propagation.

The discovery of certain easily observable [illegible]d-characters on the grains of barley made it possible to group the many varieties of each subspecies into four tolerably distinct strains, and to analyse quickly large quantities of seed of a given sort in order to determine its purity as a variety (*Sortenreinheit*). The botanical arrangement of the oat-inflorescence—*i.e.*, the number of flowers per spikelet, &c.—has made a tolerable classification of the varieties of this plant possible, and the breeder can detect at a glance at his experiment plots the presence of a valuable botanical variation.

These purely botanical characters have correlated with them valuable economic ones, and it has been one of the services of the Svalöf station to point out some of these correlations, and to emphasize the importance of this principle. For example, it has been found that the close-headed wheats have the strongest straw, and the three-flowered spikelets of the oat bear the largest grains.

Too much stress cannot be laid, according to Dr. Nilsson, upon the value of a pure botanical variety. In the production of a barley for brewing purposes uniformity of germination is of prime importance, and at the Swedish Brewers' Exposition at Malmo in 1908 the varieties which took the prizes were all botanically pure or nearly so. Such sorts as were mixtures of several strains were invariably of inferior quality. It can be easily understood that grains which are descended from a common parent show a greater uniformity, even in length of time required to germinate, than those from different parentages.

Dr. Nilsson finds that none of the existing races of cereals now sold by seedsmen are pure, but rather mixtures of different strains, which he is able to separate and identify. He holds that when a race has been produced which is botanically pure a remarkable uniformity results. Dr. Fairchild describes an area at Svalöf of 14 acres of a new variety of wheat, not yet on the market, which had for several years been subjected to the most careful selection. Every plant in the field was the offspring of the same ancestral plant which Dr. Nilsson had discovered some four or five years before. The uniformity of colour and evenness of growth were most remarkable. Two bands of dark green along the margin of the field could be seen for hundreds of yards, and were as distinct as if painted above a chalk line. Upon closer observation they proved to be formed by the dark-green upper nodes of the individual plants, which were of such uniform height that the nodes stood at the same level.

The station laboratory is a machine-shop of specialized contrivances. Among these may be enumerated counting-cases for quickly registering the grains per spikelet, specialized racks upon which the pedigreed grain is hung, tables of peculiar construction, racks and trays of convenient form, self-sorting balances, special pincers for cutting the grains of barley in two in order to examine their flour texture, abacus-like and ordinary counting-machines for diminishing the labour of calculation, ingenious shaking-sieves for grading and registering quickly large quantities of grain, marking-boards to guide the plot-planters in planting the seed, and calipers for registering the relative compactness of the wheat-head.

Dr. Nilsson has two scientific assistants, Dr. H. Tedin and Mr. P. Bolin. The former is at work upon the improvement of forage-plants, with which he has already had excellent results, while the latter has made a specialty of barley, and his Princess variety has completely superseded all other sorts through southern Sweden.

The breeding of grasses and forage-plants has only been in operation for a few years, but the results already obtained are sufficient to justify the

expectation that this work will lead to a large increase in the carrying-capacity of the pasture-lands of Sweden.

Three varieties already produced by this remarkable breeding-station may be mentioned as showing what has already been accomplished. These are the Grenadier wheat, which is just on the market, and has yielded over 70 bushels per acre, where ordinary kinds gave only 35 bushels ; the Princess barley just mentioned, which took twenty out of twenty-eight prizes offered by the Brewers' Association at a recent exposition in Malmo, Sweden : and a variety of vetch (*Vicia sativa*) quite proof against the mildew (*Peronospora*) which has for several years almost completely destroyed the fields of this fodder-plant at Svalöf. This vetch was found by Dr. Nilsson in a field which had been devastated by the disease. It was noticeably free from the malady, and its progeny now form a race which is quite immune to the *Peronospora*.

The above account gives some slight idea of the value of the Svalöf station. Its influence on the agriculture of Scandinavia can hardly be overestimated. Not only has it been the direct means of greatly increasing the agricultural resources of those countries, but it has also been the means of arousing general interest in the problems of plant-breeding, and has shown to the world the vast possibilities and great monetary value arising from the artificial improvement of the staple crops.

CAMBRIDGE UNIVERSITY.

Before the years of depression in the seventies, cereal-growing used to be a mainstay of the English farmer. Since that period, however, chiefly on the account of the fall of prices and the consequent diminished return per acre, an enormous decrease has taken place in the area devoted to the growth of cereal crops, and this is especially the case with wheat.

WHEAT AND BARLEY.

During the past ten years the Department of Agriculture of the University of Cambridge has turned its attention to pl[illegible]breeding, and the following particulars are taken from an article on the work in the *Times*, London, 26th July, 1909. The first problem that presented itself was the improvement of wheat. Preliminary investigations, both statistical and experimental, soon showed that there were possibilities of improvements in two directions. The standard English varieties of wheat more than hold their own with any foreign varieties in cropping-power, whilst, on the other hand, the best foreign varieties, on account of their superior milling and baking qualities, are worth 5s. or 6s. per quarter more than the best English wheat. Obviously, it would add something like £1 per acre to the value of the wheat

crop if the milling and baking qualities of the best foreign varieties could be combined with the vigour and cropping-power of standard English strains. Again, practically all the standard varieties of wheat throughout the world suffer considerably from a fungoid disease known as "rust," which kills off the leaves before they have done their work, and causes a depreciation in the crop which has been estimated at as much as 30 per cent. The production of rust-proof varieties might consequently be expected greatly to enhance the yield and the value of the crop per acre. If it were possible to produce new varieties combining high cropping-power, high baking-quality, and freedom from disease, it is not too much to say that the return per acre from the wheat-crop might be increased by from £2 to £3 per acre.

Preliminary experiments on the University farm, on lines similar to those followed by Mendel in his historic experiment with peas, at once pointed to the possibility of bringing this about. Hundreds of varieties of wheat were selected from all parts of the world, and grown on small test plots under close observation. Practically all of them were found to be valueless for general cultivation in England, but a few were found which possessed some especially valuable features. For instance, several produced grain of extraordinary milling and baking qualities, others were found to be quite immune to the attacks of yellow rust, and others again possessed high cropping-power, stiff straw, or other desirable characters. The systematic crossing of such varieties, each with its own good point, has given rise to a number of new types which promise to be of the greatest value.

Visitors to the University farm have seen the process of wheat-improvement in all its stages—the preliminary trials of some curious varieties from Sze-chuan, Tibet, and Abyssinia; the cross-pollinating of the mother-plants; the resulting hybrids; the second generation, in which the new types make their first appearance; the fixing of these types on small plots in the bird-proof cage, and the testing of them, when fixed, in larger field plots; and, finally, large field plots of several acres carrying magnificent crops of rust-resisting varieties now ripening their grain. Prominent among these were series of plots of new types, whose grain mills and bakes as well as the best wheat imported from Canada, and whose cropping-power promises to be at least equal to that of the standard English varieties.

The wheat problem which the Cambridge staff set themselves is apparently to all intents and purposes solved, and the new types, which will probably be distributed this autumn, may confidently be expected to put large sums into the pocket of the farmer and the miller.

Investigations on similar lines are in progress with barley. Visitors were shown a number of plots each carrying a fine crop of barley characterized

by high yield, stiff straw, or good milling quality, the properties which are most sought for in the barley crop. Each plot had originally been started from a single ear in order to secure the utmost uniformity of type. The best of these strains have been used as the starting-point for making new hybrid varieties, several hundreds of which are in process of fixation in the bird-proof cage.

The work at Cambridge was primarily for pure scientific investigations in the domains of variation and heredity, but the work already done gives ample proof of the economic value of such lines of research, which to the layman may have appeared at the commencement quite valueless for the purpose of ultimately increasing the prosperity of English farmers.

Another very important feature of the work at Cambridge is the demonstrating the necessity of breeding plants in those regions where the plants are to be grown. Thus, the Canadian hard wheats originated in Canada have been found quite useless for cultivating in England, and cereals that are fairly rust-resistant in the region in which they are produced are often very susceptible to attack when transported to other countries. This emphasizes the necessity for breeding plants in New Zealand for New Zealand conditions.

THE GERMAN AGRICULTURAL SOCIETY.

The Seed and Seed-breeding Bureau of the German Agricultural Society has for its object the sale and control of pedigree seeds of agricultural plants to its members, of which there are many thousands. Its methods have been adopted from those of the Swedish Seed Company, a committee being sent to Svalöf in 1898 to study its operations. A general account is to be found in the June, 1909, number of the Journal of the English Board of Agriculture, and need not be repeated here. It may be well to state that in Germany there is a large group of private individuals whose business is the improvement of farm and garden crops, and it is to encourage and aid these workers in securing the best results, both in growing and distributing their pedigree stocks, that this special bureau has been organized.

The main State station in Germany for plant-breeding is the Royal Plant-breeding Station, at Hohenheim, under the direction of Dr. C. Fruwith. This establishment has recently turned its attention to the improvement of clovers, and many new forms have been evolved, but are not yet on the markets. These clovers give some indication of what great improvements in yield, length of time of growth, palatability, and increased nutritive qualities, may be expected. Fruwith rightly looks upon the improvement of pasture-plants as being a field of investigation that has almost unlimited

possibilities; and this branch of plant-breeding is one which will in a short time lead to results as startling as those which have occurred with regard to sugar-beet.

AMERICAN BREEDERS' ASSOCIATION.

One of the most powerful organizations devoted to the furtherance of breeding is that of the American Breeders' Association, an institution that has been in operation for the past four years, and which is doing an immense amount of good in securing uniformity of work, formulating methods for special investigation, and, in general, advancing the science of breeding into one of the most essential and valuable of all the sciences connected with agriculture. It is split up into a large number of committees, consisting of the ablest investigators in America. The plant-breeding phase of the work is being given full prominence, as it is recognized that plant-improvement is one of the primal factors governing the agriculture of the present day. Its membership is already over eight hundred strong, and is constantly increasing. During the past, great prominence has been given in all countries to animal-breeding, and the results achieved have led to the establishment of main organizations dealing with the subject; but the American Breeders' Association recognizes that plant-breeding should go hand-in-hand with animal-breeding, and the influence of this association is likely to give a great impetus to this work in America, where even now plant-breeding is assuming important proportions. Every experiment station—and there are one or more in every State—devotes a portion of its funds to plant-improvement, and much of the money of the Adams Act is to be used in this connection. The crying need of the present-day farmer is to increase the returns from the area he cultivates, and to enable him to do this the aid of the plant-breeder must be invoked. The American Breeders' Association, in bringing before public notice the urgent necessity of more breeding-work, especially with plants, conducted in a truly scientific manner, and pursued with a definite aim, will be conducive of much good. In this respect it would be pleasing to see our A. and P. Societies act in much the same way as the American association. Select committees could be appointed that would report on the necessity for certain branches of work being undertaken, and they could collect much important information from their members, which would be of the utmost value in guiding a central breeding-station along certain lines when undertaking the breeding of special plants for special localities. These committees could also do much in impressing on the members the valuable results that are certain to accrue from properly-conducted breeding experiments.

SOME RESULTS OF A FLYING SOIL-SURVEY.

[By B. C. ASTON, F.I.C., Agricultural Chemist.]

THE two beautifully printed and illustrated quarto volumes of some eight hundred pages, recently issued by the Government Printer, embodying the researches of the Canterbury Philosophical Institute's 1907 Expedition to the Subantarctic Islands of New Zealand—a phrase coined to denote the Auckland, Campbell, Antipodes, Bounty, and Snares groups—contain much original matter, some of which will no doubt prove useful in the science of agriculture. Several of the contributors are well known as having been always ready to place their skilled services at the disposal of farmers, and, if for this reason alone, the work should arouse some interest in the minds of the agricultural community.

The history, geology, chemistry, terrestrial magnetism, botany, and zoology of the islands are exhaustively treated, and an excellent map of the south polar and sub-polar regions is appended. That some thirty specialists have contributed papers and assistance to the work is sufficient indication of its aim and scope.

The article which is likely to have a more immediate bearing on agriculture is an account of the soils by the writer, who acted as agricultural chemist to the expedition. It is here intended to summarize and elucidate the more salient results of that report.

New Zealand soils are for the most part sandy, clayey, or loamy (a mixture of the two foregoing), and one of the problems of our agricultural practice is how best the already small store of humus in the soil may be supplemented. These island soils are overbalanced in a contrary direction, the difficulty being to enrich the humus with mineral matter. The amount of this in an island soil is generally a fair index to its richness. On burning, the poorest soils yield less than 10 per cent. of ash, the richer soils from 25–30 per cent., and the richest from 30–40 per cent. The effect of mineral matter is responsible for the rather curious fact that the upland soils are generally richer than the lowland. The humus-layer can never accumulate to a very great depth on a steep unforested slope, a limit being ultimately reached when saturated with water the mass of humus breaks away, carrying stones and clay with it. This bog-slide enriches a lower-lying area, or tears a way through the forest zone to the sea, leaving a hillside scar which now becomes the site of a soil with a higher mineral content.

Perhaps the most prominent fact discovered was the ease with which the soils of the Auckland Islands could be separated into certain types, each type corresponding to a characteristic flora which it supports (see Table A).

TABLE A.—ANALYSES OF AUCKLAND ISLANDS SOILS.

Sample No.	Formation.	Nitrogen.	Mineral Matter.	Lime (CaO).	Magnesia (MgO).	Potash (K_2O).	Phosphoric Acid (P_2O_5).	Salt (NaCl).	Flora.
J 795	Hill humus	2·39	22·85	0·21	0·30	0·32	0·31	0·15	*Danthonia antarctica* meadow, containing also *Pleurophyllum Hookeri*, *Coprosma cuneata*, *Gentiana* sp., *Celmisia vernicosa*, *Veronica Benthami*, *Bulbinella Rossii*, *Carpha alpina*, *Hymenophyllum multifidum*.
796	,, ...	2·59	23·55	0·21	0·32	0·20	0·22	0·15	
810	,, ...	2·43	30·15	0·23	0·25	0·30	0·56	0·12	
794	Lowland humus ..	1·73	3·83	0·38	0·55	0·16	0·15	0·20	Rata (*Metrosideros lucida*) forest, containing also *Danthonia bromoides*, *Myrsine divaricata*, *Dracophyllum longifolium*, *Coprosma parviflora*, *Cassinia Vauvilliersii*, *Panax simplex*, *Hymenophyllum multifidum*.
797	,, ..	1·38	3·00	0·27	0·52	0·08	0·08	0·20	
809	,, ..	2·10	3·26	0·31	0·45	0·06	0·16	0·10	
816	,, ..	1·71	3·85	0·38	0·60	0·07	0·15	0·14	
819	,, ..	1·71	3·95	0·36	0·38	0·07	0·15	0·10	
825	,, ..	1·31	2·75	0·58	0·45	0·08	0·16	0·13	
K 2641	,, ..	1·28	3·39	0·21	0·61	0·22	0·18	0·16	
J 811	Rich humus ..	2·58	32·08	0·46	0·43	0·36	0·81	0·22	*Pleurophyllum* meadow, entirely herbaceous. Plants chiefly *Ligusticum latifolium*, but containing also *Pleurophyllum criniferum*, *P. speciosum*, *Carex trifida*, *Aspidium aculeatum* var. *vestitum*.
813	,, ..	2·27	37·05	0·43	0·33	0·35	0·95	0·16	
824	,, ..	2·92	17·15	0·85	0·53	0·15	1·45	0·78	
K 2645	,, ..	1·66	12·52	0·87	0·52	0·66	0·71	0·11	
J 803	Littoral humus ..	2·00	7·87	0·31	0·39	0·09	0·33	0·41	Littoral plants, chiefly *Poa foliosa*, *P. littorosa*, *Stilbocarpa polaris*, *Samolus repens*, *Veronica elliptica*, *Plantago Brownii*, *Tillæa moschata*, *Cotula plumosa*, *Dracophyllum longifolium*.
805	,, ..	2·96	4·19	0·72	0·55	0·12	0·26	0·27	
806	,, ..	2·27	6·57	0·32	0·35	0·12	0·32	0·34	
815	,, ..	2·68	10·15	0·35	0·31	0·22	0·30	1·28	
K 2642	Calcareous humus ..	1·93	53·96	19·36	2·98	0·66	1·88	0·12	*Bellis perennis*, *Rumex neglectus*, *Agrostis* sp., *Trifolium repens*, *Scirpus* sp., *Sagina procumbens*, *Ranunculus acaulis*, *Holcus* sp., *Cerastium glomeratum*.
J 823	,, ..	0·97	67·79	27·80	1·40	1·07	1·95	0·41	

NOTE.—The figures are those for the total constituents calculated on the soil dried at 100°. The difference between the mineral matter and 100 is organic matter.

"FAIRCHILD'S GARDEN," ADAMS ISLAND.

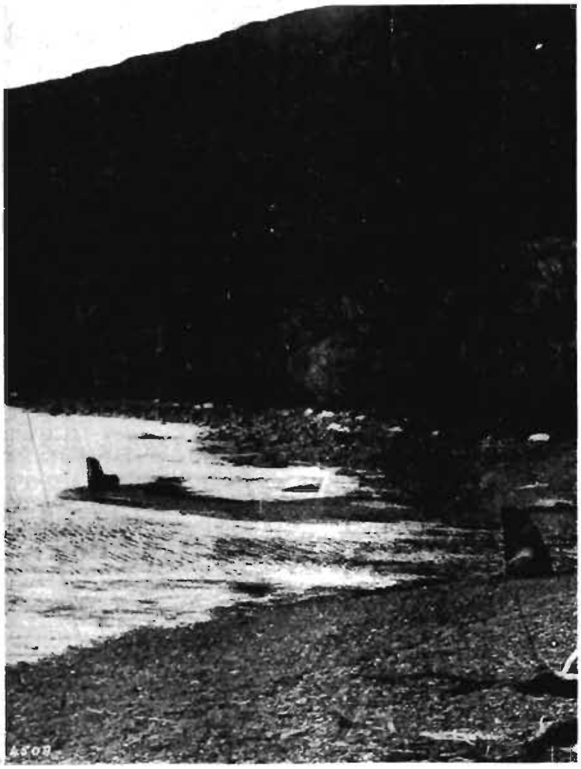
The richest soil (No. 1 type) in the Islands. The flowering-plant in the centre is *Ligusticum latifolium*. [*Photo. H. Chapman.*

AUCKLAND ISLAND, ABOVE CAMP COVE.

The upland tussock land is a rich soil (No. 2 type), into which the roots of *Danthonia bromoides* penetrate 5 ft.
[*Photo. Canterbury Philosophical Society.*

This correlation of the quality of the soil with the quality of the flora is most interesting, and suggests the possibility of utilizing the same principle in classifying the soils of the New Zealand mainland.

Excluding the calcareous humus soil, which only represents a very small area of the Auckland Islands, there are four easily recognizable main types. Thus, the richest soil (1) was found always to support a dense herbaceous



MUSGRAVE HARBOUR.

The forest (chiefly rata, family *Myrtaceæ*) soil (No. 3 type) is the poorest in the Islands.

[*Photo. Canterbury Philosophical Society.*

growth, the plants* of which chiefly belong to the *Umbelliferae*, the family which contains the carrot, parsnip, and fennel. From what we know of the carrot and the way in which it will respond to liberal manuring, it is not surprising to find its allies growing so abundantly and luxuriantly in an uninhabited island on a virgin soil containing a total phosphoric-acid content of from ¾ to 1½ per cent., and from 0·06 to 0·08 per cent. of available phos-

* A formation known to botanists as "Fairchild's Garden" or "*Pleurophyllum* meadow."

phoric acid, with comparatively large amounts of other mineral nutrients and nitrogen.

(2.) The hill humus soils above the bush-line are not so rich in mineral nutrients as the previous type, and are recognized through being covered by a dense growth of giant *Danthonia* tussock (*D. antarctica*).*

(3.) The lowland humus soils comprise the area under rata (*Metrosideros lucida*, Family *Myrtaceæ*) forest, and are the poorest in the islands, containing only a few per cent. of mineral matter.

(4.) The littoral humus soils, being those adjacent to the sea, are richer than No. 3, but contain a larger amount of salt, and hence support a halophytic type of plants.

LITTORAL SOIL (NO. 4 TYPE) SUPPORTING PLANTS TOLERANT OF SALT (HALOPHYTES)—*Poa littorosa*, *P. foliosa*, AND *Olearia Lyallii* IN PHOTO. [*Photo. Dorrien Smith.*

The nitrogenous content of the island soils, which is much higher than is ordinarily found in peat, is worthy of brief allusion. The discovery of a soil containing when dry as much nitrogen as steamed bonedust, the most expensive constituent of manures, immediately prompts one to ask, why cannot the soil be made use of as a commercial source of nitrogen. Perhaps some day this will be done ; at present it is sufficient to quote two objections —(1) distance from New Zealand, and (2) difficulty of converting the nitrogen to a more available condition.

The unusual matting-together of plant-roots on the islands is a most beautiful illustration of the necessity for supplying mineral food to plants,

* The "*Danthonia* meadow" of the botanists.

and the avidity with which they will search for it. In several localities it was observed, on making a trench through the soil, that the roots of plants grew downwards through many inches of humus containing little mineral matter—a few per cent. merely—finally developing a thick mat of root-fibres resting either on a layer of rock or of clay. Thus a clay subsoil 12 in. in thickness, lying 32 in. below the surface, contained twelve times as many roots as the first 18 in. of humus. The roots of the giant tussock (*Danthonia antarctica*) were traced down to a depth of 4 ft. 9 in. into clay. The matting of roots in the subsoil is, of course, quite an unusual occurrence, the roots usually being fewer the deeper one descends below the limit of cultivation.

It was thought probable that the action of humus-acids on the rocks would be somewhat different from that of the ordinary atmospheric influences. Evidence was sought as to the composition of contiguous weathered and unweathered rocks. The astonishing discovery was then made that the alkalis, potash and soda, scarcely decreased in the weathered portions, there being sometimes no decrease. Thus in a basalt imbedded below humus soil, which had weathered to a pink, easily friable, siliceous mass, some 94 per cent. of the original potash was found, and all the soda; while the iron, lime, and other bases had almost entirely disappeared, as shown by the accompanying table.

TABLE B.—ANALYSES OF WEATHERED AND UNWEATHERED BASALTS.

—	K 752. Weathered.	K 752A. Unweathered.	J 833A Weathered.	J 833B. Unweathered.	K 3005A. Weathered.	K 3005. Unweathered.
Water	8·32	0·11	0·33	0·20	2·30	1·15
Silica	42·36	55·75	72·20	45·85	51·65	49·75
Calcic oxide	2·60	4·30	0·55	9·92	5·50	5·65
Ferric and ferrous oxides ..	9·11	14·76	1·50	14·94	6·60	12·67
Titanium-oxide	2·11	0·75	2·70	4·10	3·50	3·75
Magnesic oxide	1·86	0·54	0·13	6·69	0·76	1·33
Manganese-oxide	0·20	0·20	..	0·09	0·55	0·60
Sodic oxide	4·53	5·90	6·66	3·45	7·47	7·57
Potassic oxide	2·43	2·23	2·97	2·02	1·92	1·61
Alumina	26·48	15·03	13·65	13·10	19·12	15·25
Phosphoric anhydride ..	Trace	0·77	Trace	0·11	0·98	0·80
	100·00	100·34	100·69	100·47	100·35	100·13

NOTE.—Those pairs enclosed in brackets refer to the same rock.

Merrill ("Rocks, Rock-weathering, and Soils"), a high American authority, gives a number of analyses of basalts and their residuals on weathering, and calculates the percentage of each ingredient lost. Potash is always lost in large quantities. It is well known that peaty soils, even when apparently

ENDERBY ISLAND.

The beach-sand is almost pure carbonate of lime, and would be of great value in ameliorating the humus soil of these islands.

[Photo. Dorrien Smith.

NATURE'S PHOSPHATE-FACTORY, BOUNTY ISLANDS.

The birds are slowly transforming the granite rock into mineral phosphate.

[Photo. H. Chapman.

containing an excess of potash, respond to potassic manuring; and the knowledge that humus-acids hinder the decomposition of potassic compounds in the soil may possibly help to account for the fact. It is gratifying, since this was published, to learn that a Russian chemist has independently arrived at a similar conclusion (see A. Nikiforov, abs. in Exptl. Stat. Record, Vol. xxii, 4, p. 317).

A diligent search made for a marketable phosphate was merely rewarded by discoveries of theoretical interest only.

The formation of mineral phosphate was observed on the Bounty Islands. Millions of penguins perch on the angles of the tumbled granitic monoliths of which the islands are composed. The granite is in many places covered with a polished scale which contains over 25 per cent. of mineral phosphate.

On Campbell Island, the most likely place for a phosphate-field to occur, only traces of the blue mineral vivianite (phosphate of iron) were found.

At Antipodes Island the basalts and scoriæ, and the soils derived from these, proved to contain abnormally large quantities of phosphoric acid, a fact which has wakened the interest of a well-known mineralogist. At Enderby Island the sandhills consist of finely broken shell and the remains of sea-animals, which accounts for the sand containing 91 per cent. of carbonate of lime. Were this deposit on the mainland it would soon be utilised, as it would run easily through a drill, and prove a most valuable dressing for soils deficient in lime.

Campbell Island is the only island of those visited which is inhabited, it being utilized as a sheep-run. Of interest to pastoralists, therefore, is the news that even in this recently stocked country are the native grasses disappearing, and their places being taken by a beautiful indigenous plant (*Bulbinella Rossii*), locally known as "lily," which has become a noxious weed. Pigs are largely exterminating the plant at Auckland Island, and it is reasonable to suppose that, if introduced, they would do the same at Campbell Island, where, owing to the absence of forest, they could easily be kept under control. A remarkable effect of the soft soil here is that the feet of the sheep grow outwards, and become turned up like a ram's horn. A similar effect in horses was observed by the "Challenger" expedition when at Falkland Island. These islands must be very similar in climatic and soil conditions to Campbell Island, and possibly an exchange of grass-seed might be beneficial to both. Enderby Island (in the Auckland Group) is similarly being rapidly degrassed by the herd of cattle placed on it. If these islands are continuously to carry stock, it is therefore only a question of time when the regrassing will become an acute problem. Situated as it is at the entrance to Port Ross, which Hooker called the finest harbour in the world, Enderby Island contains on its flat surface every constituent necessary to make a perfect soil—viz., clay, calcareous phosphatic sand, and humus.

GANGRENOUS FOOT-DISEASES OF CATTLE (BACTERIAL NECROSIS).

By H. A. REID, F.R.C.V.S., Officer in Charge of Veterinary Laboratory.

GANGRENE of the feet, principally affecting cattle, has been frequently reported from various parts of the country. The disease appears to be endemic in certain localities. Reports on the appearance of cases of this nature have been almost exclusively confined to the North Island, a fact which will be considered in relation to the cause of the condition.

In certain districts such outbreaks in the past have nearly always been referred to the effects of ergot. It is possible that in certain instances ergot may share indirectly in the production of the gangrenous lesions, but I consider that it yet remains to be proved whether the ingestion of ergotized food has any special significance as a potential factor in the etiology of the disease.

Shortly after rejoining the Department in 1908 I had an opportunity of investigating an outbreak of gangrene affecting cattle. The trouble had been almost unanimously declared by farmers in the locality to be due to ergot poisoning. The result of my investigations then led me to doubt whether ergot could be held responsible, and later observations have convinced me that true ergotism must be a rarer condition than is generally supposed, since I have never yet observed the classical symptoms attributed to this form of poisoning. My conclusions regarding the nature of the outbreak referred to were embodied in a report to the Chief Veterinarian, from which the following remarks are extracted :—

" None of the cattle on adjacent farms appear to have been attacked, and the owner himself, an intelligent farmer, does not ascribe the trouble to the effects of ergot. Moreover, none of the symptoms generally recorded of poisoning by this agent are present — such, for example, as gastro-enteritis, congestion and hæmorrhages of the visible mucous membranes, emaciation, abortion, and the usual history of occurrence during cold weather. . . . In the absence of more definite information, I do not feel satisfied that the symptoms are the result of ergotism, and have therefore to conclude that they are due to some topical irritant of undetermined origin."

The symptoms which generally characterize the affection are as follows : As a rule, heifers or milking-cows are attacked towards the fall of the year or during winter. A keen observer will notice that certain of the animals appear restless, and disinclined to support weight on one particular leg, generally a hind leg. In the bails cows may be seen to stamp or paw the ground with the affected foot. Later on, lameness becomes apparent, gradually becoming acute, and accompanied by painful swelling of the pastern and fetlock. Constitutional symptoms, in the shape of loss of appetite and condition, fever, constipation, and diminution of the milk-secretion accompany the appearance of the local lesion. In about two or three days the swelling breaks above the coronet, discharging purulent contents. Gangrene of the affected portion of the limb then sets in ; the

lesion extends, and involves the tissues below the cannon bone. The claws, or even the whole of the foot, may slough off from the joint, leaving the denuded bone exposed. Above the gangrenous area the limb remains in a normal condition, a sharp line of demarcation, composed of congested and œdematous tissue, existing between the gangrenous and healthy portions. There is complete loss of sensation below this area, but the blood-vessels may still be active, the gangrenous part bleeding on manipulation. It is most common to find only one leg affected. As a general rule, when taken in time and properly treated, the disease runs a benign course. Resolution takes place in about twelve to fourteen days. In consequence of the diminished milk-supply and loss of condition of the affected subjects, owners frequently suffer serious monetary loss, while the dressings and attention which must be given in order to promote recovery occupy a considerable amount of time which might otherwise be more profitably employed.

An Allied Condition affecting Pigs.

A number of cases presenting similar though differently situated lesions have come under observation affecting pigs. In these animals the snout and skin covering the head and sides of the shoulder are generally the sites of the necrotic lesions. These take the form of a spreading ulceration, giving rise to great irritation and loss of condition. Occasionally the skin and integument around the eyes are involved. The resulting inflammation affects the conjunctiva, inducing a purulent discharge from the eyes, which may lead to temporary or permanent loss of sight. In very severe cases the ulcerated surface may extend over an area from two to three inches up to the size of a dinner-plate in dimension, giving rise to deep excavations, surrounded by a hard, fibrous-looking growth. Under suitable treatment recovery can usually be effected, although in young animals serious mortality may follow, with embolic, necrotic lesions in the liver and kidneys.

The essential cause of these conditions in both cattle and swine has been determined to be due to a micro-organism known technically as the *Bacillus necrophorus* (Flugge). This organism—first isolated by Loffler in 1884 from cases of so-called "calf-diphtheria"— has since been observed and studied by various authorities, notably Bang, McFadyean, Schmorl, Mohler, and Morse. Bang, on account of the characteristic lesions following infection, termed it the "necrosis bacillus." The appearance generally assumed by the bacillus is in the form of long, slender filaments, measuring 80–100 microns in length, and from 0·75–1·5 microns thick. Shorter bacillary forms are also frequently observed, the shortest, in fact, resembling cocci. The organism is thus polymorphic. It is a strict anærobe, only developing in the absence of air or oxygen. The necrosis organism has evidently a wide distribution in nature, leading a saprophytic existence in manure and in the soil of certain localities. Bang has demonstrated its presence in the intestines of healthy pigs, and according to Nocard and Leclainche it may be regarded as an occasional or habitual habitat of the alimentary canal of all herbivorous animals. Among the smaller animals, rabbits and mice are particularly susceptible to infection. They have been repeatedly employed to recover the organism after inoculation with material derived from a naturally infected source. Guinea-pigs are, in our experience, under ordinary conditions, immune. The necrosis bacillus is innocuous to man, unless, according to Schmorl, it is associated with the presence of pyogenic

organisms, which then render infected wounds very difficult to heal. Doubtless the same remarks would apply in the case of the lower animals. We have found it constantly associated with cocci, apparently the *Staphylococcus citreus*. The *Bacillus necrophorus* gains access to the tissues through the skin, and the factors favouring infection may be classified as mechanical, chemical, and vital. As an instance of the first group, any injury sustained resulting in a wound or abrasion may be taken. Under chemical agents may be placed influences, such as cold, continued exposure to wet or damp, or malnutrition of the skin through digestive disorders, leading to an eczematous eruption and irritation. Vital agents comprise the various bacteria present in the skin, which, under certain conditions, are capable of setting up inflammatory changes deleterious to the histological elements. One or more of these factors may be held responsible for the entrance of the necrosis organism, which can only exert its peculiar effects when the skin-surface has been injured or has otherwise undergone some abnormal change. The ingestion of ergot may be cited as a possible factor included under chemical agents. It is probable that ergot may induce some constriction of the arterioles resulting in defective vascular nutrition of the skin. It appears to be well established that necrosis of the feet more frequently occurs in cattle known to have been grazing on ergotized pastures. It is also a fact that the condition occurs on pastures wherein no evidence of the operation of this factor can be traced.

In my experience typical symptoms of ergotism have never been observed; hence in the majority of cases investigated it would not have been possible to conclude that ergot alone was responsible for setting up this condition. I would recommend that experiments be carried out to decide how far the toxic properties of ergot may influence the production of the gangrenous changes.

Introduction of the *Bacillus necrophorus* into the tissues of susceptible animals leads to a necrotic caseous degeneration of the surrounding parts. The centre of such caseous *débris* is, as a rule, devoid of bacilli. The organism should be sought at the margin of the degenerated and healthy tissue some depth from the surface. Stained preparations, examined microscopically, reveal the bacilli arranged in a filamentous mass, easily mistaken on casual observation for fibrin or loose shreds of areolar connective tissue. The *Bacillus necrophorus* is easily stained by the anilin dyes: Loffler's alkaline methyline blue, or Ziehl's carbol-fuchsin give excellent results. It does not stain by the method of Gram. The study of its physiological effects indicates that the necrosis organism elaborates an active soluble toxin which proves fatal to rabbits in from five to ten days. Generally, prior to death the animal is thrown into tetanic convulsions produced by the action of the absorbed toxin upon the central nervous system.

A significant point in relation to the study of bacterial necrosis is the fact that, so far as observation goes, it appears almost wholly confined to the North Island. No doubt the habits of the *B. necrophorus* are well adapted to the comparatively mild and humid climate of the North Island, permitting it to remain for a longer period in an active condition in the soil or excreta.

From a knowledge acquired by a study of the occurrence of the bacillus in nature, one would expect that cattle on old, soiled pastures, or those occupying dirty yards contaminated by an accumulation of fæcal deposits,

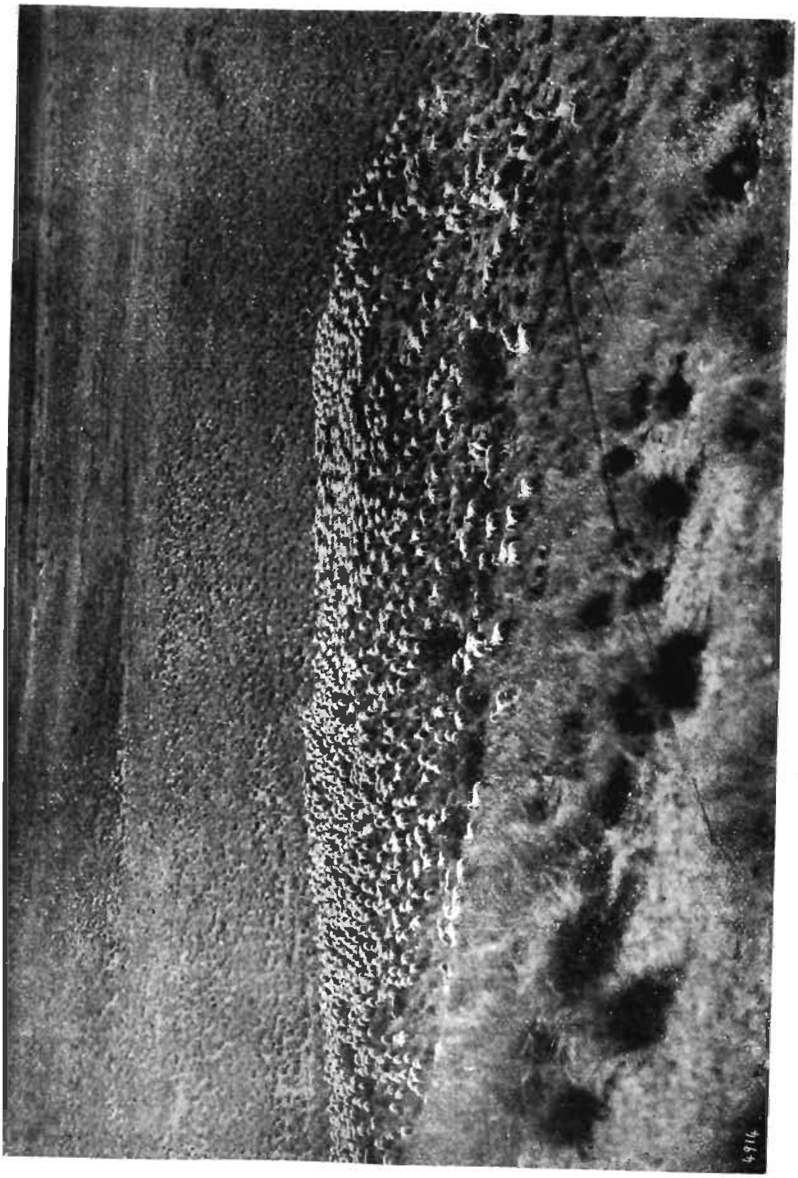
would be more prone to become affected. This, however, does not prove to be invariably the case. Cattle on freshly cleared land are sometimes found to be affected. It is noticeable that certain paddocks appear more liable to convey infection than others. These may probably afford in some way a more suitable environment for the propagation of the bacillus.

Treatment.—The treatment of this gangrenous condition calls for the energetic application of remedies which will relieve the pain caused by the inflammatory changes, and, further, destroy the action of the pathogenic organism. In cattle, whenever the first symptoms of tenderness and swelling of the coronet are observed, the part should be thoroughly cleansed with hot water containing a little soda. If practicable, a hot bran poultice, which has been prepared with the addition of a little disinfectant—such as non-poisonous sheep-dip—may be applied, and maintained in position, to promote the softening of the tissues and ultimate suppuration. The poultice must not be allowed to become cold, and should be changed at intervals during the day. By this means acute symptoms are usually relieved, and treatment should now be confined to keeping the affected parts clean, and the application of some reliable antiseptic. Carbolic acid, in the proportion of 1 part to 20 of water, has been found serviceable, or ointments composed of boracic acid or bluestone may be employed. In severe cases, where the sloughing process is already well advanced, the loose, gangrenous pieces of skin or horn should be removed by means of a knife or hot iron, leaving the unhealthy tissue exposed to the air. Antiseptics may then be applied, or the diseased parts may be lightly smeared with Stockholm tar. A saline purgative drench of Epsom salts should, as a rule, be administered, and the bowels regulated by allowing a plentiful supply of grass, or laxative feed if obtainable. On account of the lameness rendering movement extremely painful, it will often be found necessary to cut and carry the feed to the patient. In all cases it is wise to separate the affected animals from the healthy. Cow-yards and milking-bails must be kept thoroughly clean. Old yards should be dug up (or, preferably, have their surface soil for at least 6 in. depth entirely removed) and well limed, since the accumulated droppings may contain the *Bacillus necrophorus* in abundance, which on the slightest abrasion or injury may easily gain access to the feet.

The treatment of affected pigs may follow on the above lines with necessary modifications. The ulcerated surface should be cleansed, all dead and diseased tissue being removed by scraping, or the *light* application of a hot iron. The wounds may then be dressed with carbolic-acid solution (1–20), or dusted over with a powder composed of calomel (1 part) and boracic acid (10 parts). In the case of pigs, the sties should be cleansed and disinfected, and the surroundings dug up and limed. By the adoption of these principles the trouble may be checked, and recovery brought about. Neglect of treatment too often entails the loss of the affected animals.

HIGH-COUNTRY SHEEP-STATION: CRAIGIEBURN, CANTERBURY.

Extensive shelter-belts have been planted, and will add to the amenity of the beautiful situation.



MUSTERING SHEEP ON CRAIGIEBURN STATION, CANTERBURY.
Showing type of country.

30 13 JUN 1911

THE ORCHARD AND FRUIT-GARDEN.

[By W. A. BOUCHER, Assistant Director of Orchards, Garden, and Apiaries.]

III. VARIETIES OF FRUITS FOR PLANTING.

THE question, What varieties of the different classes of fruits are most suitable for planting *generally?* is one that presents considerable difficulty not only on account of the variations of surface and subsoil throughout the Dominion, but also on account of the wide range of climatic conditions. Moreover, as from time to time some of the new varieties that are continually being tested prove themselves suitable for planting either for commercial or for domestic purposes. or for both, it is desirable that those who wish for information on this important point should consult officers of the Department or experienced fruit-growers resident in the localities in which they are interested. Some of the varieties proved as commercially profitable are,—

APPLES.

American Horn,
Ballarat Seedling,
Cleopatra,
Colonial Washington,
Delicious,
Five-crown Pippin,
Golden Pippin,
Gravenstein,
Jonathan,
Lord Wolseley,
Munroe's Favourite (syn. Ohinemuri),
Northern Spy,
Pigeonette,
Reinette du Canada,
Rhodes Orange,
Rokewood,
Rymer,
Scarlet Pearmain,
Scarlet Queen,
Sturmer Pippin.
Yates.

Cox's Orange Pippin, one of the best for quality, is in many localities so subject to woolly aphis that it is not extensively planted, as would otherwise be the case.

PEARS.

Bourre Bosc,
Beurre Capiaumont,
,, Clairgeau,
,, Diel,
,, Hardy,
Doyenne du Comice,
Fertility,
Josephine de Malines,
Keiffer's Hybrid,
Louise Bonne of Jersey,
P. Barry,
Vicar of Winkfield,
Williams's Bon Chrétien,
Winter Cole,
Winter Nelis.

PEACHES.

Briggs's Red May,
Carman,
Elberta,
Gold Dust,
Hale's Early,
Hobbs's Late,
James's Seedling,
Kalamazoo,
Mamie Ross,
Muir,
Queen Charlotte,
Royal George,
Salway,
Sea Eagle,
Triumph,
Wager,
Wheatland,
White American,
Wiggins.

PLUMS (English).

Angelina Burdett,
Cherry Plum,
Coe's Golden Drop,
De Montfort,
Early Orleans,
Evans's Early,
Giant,
Golden Prune,
Grand Duke,
Jefferson,
July Greengage,
Kirke's,
Pond's Seedling,
Prince of Wales,
Purple Gage,
Takapuna Drop,
Tennent,
Victoria (Denyer's),
Yellow Magnum Bonum.

PLUMS (Japanese).

Burbank,
Lord Kitchener,
Ogon,
Satsuma,
Wright's Early.

NECTARINES.

Ansenne,
Early Rivers,
Gold Mine,
Hunt's Tawny,
New Boy,
Rivers's Orange,
Zealandia.

APRICOTS.

Hemskirke,
Large Early Red,
Moorpark,
Newcastle,
Oullin's Early,
Royal.

CHERRIES.

Bedford Prolific,
Black Eagle,
Black Heart,
Black Tartarian,
Early Purple Guigne,
May Duke.

FIGS.

Brown Turkey,
Smyrna,
White Adriatic,
White Ischia.

ORANGES (Sweet).

Paramatta,
St. Michael.

ORANGES (Marmalade).

Poor Man,
Seville.

LEMONS.

Eureka,
Lisbon.

LOQUAT.

Nagasaki.

QUINCES.

Angers,
Champion,
Orange,
Van Diemen.

JAPANESE PERSIMMONS.

Dai Dai Maru,
Haiyakume,
Tane Nashi,
Zengi.

WALNUTS.

English,
Large French.

STRAWBERRIES.

Duke of Edinburgh,
La Marguerite,
Laxton's No. 1.
Laxton's Noble,
Sir Joseph Paxton.

RASPBERRIES.

Northumberland Fillbasket,
Semper Fidelis.

GOOSEBERRIES.

Red.

Conquering Hero,
Crown Bob,
Farmers' Glory,
Lion's Provider,
Ploughboy,
Rifleman.
Roaring Lion.

GOOSEBERRIES—*continued.*

White.

Eagle,
Snowball,
Snowdrop,
Whitesmith.

Yellow.

Broom Girl,
Drill,
Gunner,
Smiling Beauty.

Green.

Green Overall,
Gregory's Perfection,
Marigold,
Plunder.

CURRANTS.

Red.

Cherry,
Fay's Prolific,
La Versailles.

White.

White Dutch.

Black.

American Black Champion,
Carter's Black Champion,
Common Black,
Kentish Hero,
Lee's Prolific.

Although this list is of considerable length, the fact that there are others of a great deal of merit which have not been mentioned is not to be overlooked.

The difficulty that presents itself, but that is being gradually overcome, is to find varieties, early, mid-season, and late, suitable for our local requirements, dessert or cooking, for canning or for export, that will adapt themselves to the different soils and varied climatic conditions of New Zealand.

An important point bearing on this question is the fact that already certain varieties, for instance, of apples, such as Gravenstein, Munroe's Favourite, Jonathan, Sturmer, Delicious, and of pears, such as Williams's Bon Chrétien, Beurre Diel, Beurre Clairgeau, Vicar of Winkfield, Winter Cole, and some others, have proved their adaptability to many different classes of soils and very varied climatic conditions.

As the number of generally adaptable varieties becomes extended—as it will, no doubt, year by year—the list of varieties now considered valuable by commercial growers will be considerably curtailed, with great advantage to orchardists and the industry, for, whether the local markets or an export trade are to be supplied, large lines of a few well-recognized varieties are to be desired, rather than small lines of a large number of kinds with the names of which the consumer is never likely to become acquainted.

IV. MARKETING THE FRUIT.

GRADING AND PACKING.

One of the most important questions connected with the fruit industry is that of grading and packing; and, in view of an export trade, in apples and pears at any rate, the general adoption of cases of uniform shape and capacity is most desirable. The degree of perfection attained in the handling of fruit in other fruit-exporting countries will no doubt be emulated by the growers throughout the Dominion; for it is obvious that, if the best values are to be obtained, the methods of handling the fruit prior to packing, the grading, packing, and the appearance of the cases when opened up for sale, must be equal to those of other fruit-exporting countries, with the produce

of which our fruit is likely to come into competition in the world's markets. Bruising of fruit, either before or while packing, is always undesirable, but especially so when the fruit is destined for long-distance transit in cool-storage, for, in the case of some varieties particularly, every bruise, however slight, becomes a distinct blemish, which, even if it does not cause actual decay, detracts considerably from the market value, the best class of trade declining to handle bruised or blemished fruit.

PICKING, GRADING, AND PACKING APPLES.

In the gathering and packing of fruit for cool-storage or export it is important to note that not only should every care be taken to avoid bruising, but that the fruit should be carefully selected. It may be as well to point out,—

(1.) That immature fruit shrivels ;
(2.) That fully ripe and overripe pears have proved a complete failure in cool-storage ;
(3.) That apples which when ripe are of soft texture should be gathered for cool-storage before becoming fully ripe.

In the case of the Williams's Bon Chrétien pear destined for the cool-chamber, this variety must be picked green and placed in the chamber as soon as possible after being gathered. With regard to apples it may be accepted as a general rule that the best results are derived when the fruit is allowed to mature and colour well, but is gathered a shade on the green side as it is termed—that is, not fully ripe.

In this connection the method of handling apples for export as described in "Fruit Growing and Marketing in California" (Bulletin No. 17) is well worthy of consideration, and is here reprinted :—

"In every stage of the picking and after-handling, apples, especially those intended for export, are treated almost as carefully as eggs. Before being packed for the export trade the fruit is stored for about a month, so that full opportunity may be given for the detection before packing of apples attacked by codlin-moth or other pests. Such fruit is, of course, discarded.

"Before packing, the apples are graded for quality and size, there being two grades for quality and three for size.

"The first grade for quality consists of fruit that is absolutely free from blemish of any kind ; the second is slightly blemished fruit.

"In the Watsonville district the only grades for size that are recognized are—(1) 4½-tier, which consists of apples of a diameter of from 2¼ in. to 2⅝ in. ; (2) 4-tier, diameter from 2⅝ in. to 3¼ in. ; (3) 3½-tier, which consists of apples that exceed 3¼ in. in diameter.

"The four-tier is looked upon to give the best returns, and is also the standard for grading, as when packed there are four tiers of apples and four apples in each row, crosswise of the case. The dimensions of the Californian apple-case are 9¾ in. by 11 in. by 22 in.

"The apples of the lower layers are wrapped with ordinary fruit-wrapping paper, while the apples of the top layer are wrapped in paper upon which is printed the name and address of the packer or grower."

It should be borne in mind that considerable experience is required before grading and packing can be performed with ease, rapidity, and accuracy ; therefore it would seem to be desirable, in order that the neces-

sary practical experience may be acquired, that growers should grade fruit destined for local consumption as carefully and accurately as will be required for the export trade.

PICKING, WASHING, GRADING, AND CURING LEMONS.

The production of lemons promises to become an important branch of the orchard industry of New Zealand, and the Californian method of handling will be found advantageous :—

" The lemons are carefully cut from the tree with clippers specially made for the gathering of citrus fruits. A close clean cut is made, so that there may be no possibility of a sharp stem-end puncturing or injuring other lemons in the after-handling. Great loss by decay in transit was discovered by investigation by the United States Department of Agriculture to be caused by the lemons being thus injured. Lemons should always be carefully cut, and never pulled, from the trees, as in pulling the skin is lifted from the top, causing premature decay. In gathering, more attention is paid to size than to ripeness, as the market demand is for a lemon of medium size. Lemons gathered green with a faint tint of yellow take on, in the process of curing, a richer yellow colour than fruit that is allowed to colour on the trees. Moreover, the green lemons keep longer and carry better than those that ripen on the trees. It is, of course, impossible to gather all the lemons green, as some will colour before they have attained a fair marketable size. As a test for size in gathering lemons a ring $2\frac{1}{4}$ in. in diameter is usually carried, for it is the lemon that most nearly approaches this diameter when gathered that gives the best market value when cured and packed.

" There are three sets of sizes to which the lemons are graded for packing,—

" (1.) Lemons that pack from 180 to 270 to the box are termed the ' large off ' size.

" (2.) Lemons that pack from 360 to 490 to the box are termed the ' small off ' size.

" (3.) Lemons that pack 270 to 360 to the box are termed the ' regular ' size.

" ' Large off ' and ' small off ' sizes are not expected to realize full market rates. It is to the ' regulars ' that the grower looks for his most profitable return. There are three grades each of the ' large off,' ' small off ' and ' regular ' sizes, so that in all there are no fewer than nine grades recognized in the commercial handling of the lemon.

" When the lemons reach the packing-house they are washed, graded, and weighed, each grower being credited with the weight of the lemons of each grade.

" The washing-machine consists of a large galvanized-iron tank with a capacity of 1,000 gallons. At one end of this tank are two sets of brushes arranged in a circle, one set being stationary and the other set revolving. Springs at the back of each revolving brush prevent injury to the lemons. The revolving set of brushes draws in the lemons and carries them round almost an entire circle to a point where revolving arms gather and convey them to three endless belts all travelling in the same direction. Arrived at the belts, the grading for ripeness and culls (that is, bruised and unmarketable fruit) is carried out by the simple process of diverting the lemons

to one band or another, each band carrying the lemons diverted to it to boxes arranged for their reception. Ripe, oversized, or undersized lemons—fruit, in fact, that the grader considers not to be of the highest grade, or of the keeping qualities of which he is doubtful—are placed on trays made of timber, the dimensions of these trays being 3 ft. by 2 ft. 6 in., by 4 in. in depth, outside measurement. These trays are stacked one upon another to a height of about 5 ft., and examined from time to time for decayed fruit. When all fruits that are likely to decay have been discovered and removed, the remaining lemons from the tray are graded, packed, and shipped.

"The green unblemished lemons which the grader considers would keep for several months are placed in ordinary packing-boxes, which are stacked one upon another in tents in the packing-houses. This method of using tent compartments instead of wall compartments is one of great interest. The tents are about 8 ft. square and high, with flat canvas roofs; four stout canvas sides are arranged so that each can be lifted like a window-blind. Each tent compartment consists of a stout frame to carry the canvas sides and top, while hooks short distances apart on the canvas sides enable them to be attached closely when necessary to the four corner uprights, giving each compartment an atmosphere of its own. It will be readily seen what complete control these tents give over conditions of temperature and moisture, and also how the lemons of each tent compartment can be separately treated so as to bring about the desired results. It is, in fact, possible to have lemons fresh and of three or four months' gathering in the same packing-house, and yet control the conditions of temperature and moisture to suit each. If it is desirable to completely change the atmosphere to suit the contents of any compartment, it is only necessary to run up the four sides when there is a fresh dry breeze; while the close canvas sides make it possible to shut out almost entirely an atmosphere containing an excess of moisture which would be injurious to the curing lemons. This method of curing lemons is well worth careful experiment, for I see no reason why we should not be able to produce a perfect lemon by adopting such a simple and economical means of controlling the atmosphere in which the lemons are being cured."

PICKING AND PACKING OF STRAWBERRIES.

For marketing the strawberries, boxes holding ¾ lb. are generally used in southern California, and might with advantage be generally adopted in New Zealand. Fifteen of these are packed in a case. Very shallow packages are used, so that there is the least possible pressure on the lower layers of fruit, and each package is thoroughly ventilated, so that there is ample air-circulation to keep the lower layers in almost as good condition as the upper. The method, as described in Bulletin No. 17, is as follows:—

"Each picker is provided with a tray holding eight ¾ lb. boxes. When picking, five or six of these boxes are partially filled with berries, space being left for the top layer; the remaining two or three boxes are filled with the better-coloured berries. At convenient distances throughout the extensive strawberry-beds, posts are set up with an arm carrying an overhead wire; as will be seen in the accompanying illustration, each overhead wire leads to a small packing-house. A number of cases of picked boxes are placed on a carrier hanging from the wire, and so run up to the packing-house. This enables the picker not only to convey a greater number of boxes to the packing-house at one time, but also much shaking and jarring

of fruit is avoided. Arrived at the packing-house a packer takes charge, and finishes off the top layer of each of the five or six partially filled boxes with the selected fruit from the remaining two or three boxes. As the fruit is sold on its merits, each packer endeavours to keep up as fine a general standard as possible."

OVERHEAD WIRE CARRYING PICKED FRUIT FROM BEDS TO PACKING-SHED. Also showing Strawberries grown on double-row system.

THE GRASS-SEED MARKET.

DURING the present season the prices of grass-seeds of nearly all descriptions will be much in advance of those of the past few years. The failure of the American cocksfoot harvest has been the cause of large shipments of New-Zealand-grown seed to the United States, and, as this season's crop in the Dominion is light on average, the price locally will be extremely high for a considerable time to come. White clover, owing to the small European harvest, has advanced quite 50 per cent., and timothy, generally one of the cheapest of grasses, last season worth £22 per ton, is now quoted at over £40 per ton. The local rye-grass harvest, owing to unfavourable weather-conditions, is almost certain to be considerably below the average, and prices will in accordance be much higher than usual. This increase in prices will naturally render the sowing of bush-burns an expensive operation, and farmers will be likely to reduce the amount of seed used per acre. This policy is, however, a very bad one, as it will result in a thin sward, and allow the germination of any weed-seeds that may happen to fall on the ground.

THE EXPORT OF APPLES.

WITH a view to obtaining reliable information at first hand as to the prospects of an apple-export trade, the Director of Orchards, Gardens, and Apiaries wrote to prominent fruit-brokers in the following cities of Great Britain and the Continent of Europe: viz., London, Glasgow, Liverpool, Hamburg. The British Consuls at Buenos Aires, Rio de Janeiro, and Monte Video were also communicated with as to the possibility of recovering and extending the trade formerly existing between South America and New Zealand.

Many of the replies give useful information in response to the several queries, and elucidate points not touched on by others; so that it seems desirable to give the correspondence *in extenso*.

(Letter.)

FROM T. W. KIRK, DIRECTOR OF ORCHARDS, GARDENS, AND APIARIES, TO

Messrs. Lohmann and Co., Hamburg.
.. Astheimer and Sohn, Hamburg.
.. Edwards, Jacobs, and Sons, Covent Garden, London.
.. Garcia, Jacobs, and Co., Covent Garden, London.
.. J. B. Thomas, Covent Garden, London.
.. Simons, Shuttleworth, and Co., Liverpool.
.. Simons, Jacobs, and Co., Glasgow.
.. Hyslop and McDonald, Glasgow.

I am venturing to write you in connection with the New Zealand fruit-export industry, which is now rapidly developing, and bids fair to assume much greater proportions. Several considerable shipments have already been sent to Great Britain and to America, and it is hoped that such shipments will be a regular thing in the near future. It is possible that the recent consignment of apples and pears to London has come under your notice.

With a view to a further extension of our trade, I am anxious to obtain full particulars of the conditions prevailing in your city, and I shall, therefore, be extremely grateful for any particulars that you may be good enough to supply me with, and particularly such as relate to the following:—

(1.) What opening is there in your city for the sale of New Zealand fruit-especially apples and pears ? and
(2.) What price per bushel could reasonably be expected ?
(3.) What would be the duty levied on our fruit ?
(4.) What, approximately, are the usual charges for examination, lighterage, wharfages, cartages, &c., say, per bushel case ?
(5.) *Would it be possible to send me a copy of the certificate, if any, required by the authorities. The one which we have recently sent to London was as follows:—

"I certify that the fruit sent per [*Ship*] was grown at [*District*], New Zealand, and that the same is, to the best of my knowledge and belief, free from disease."

This is signed by the Government Fruit Inspector. Of course, full details of the marks are given.

I am posting you a copy of the last annual report of this Division, and also a copy of the special fruit number of the *New Zealand Farmer*: these will be found to contain some interesting articles on the New Zealand fruit trade.

Trusting that you will pardon the trouble I am giving you, and, if there is anything I can do in return, that you will not hesitate to command me.

The following replies were received :—

Messrs. Astheimer and Sohn, Hamburg.

We have much pleasure in acknowledging the receipt of yours of the 6th ultimo, the contents of which are very carefully noted. By the present we take the liberty of giving you some details regarding our market, as follows :—

(1.) During the season just finished about 80,000 cases of Australian apples have been imported from South Australia and Victoria, of which we have handled one-third—viz., about 30,000 cases. The demand for Australian apples is increasing every year, and whereas about eight years ago 10,000 cases were sent to our market, last season more than 80,000 cases have been imported to Hamburg, and we are quite sure that our market can take far larger quantities, as the consumption is increasing continually.

(2.) Under separate cover we are sending you our catalogues of last season's shipments. In our opinion, M.10/13 per box (10s. to 13s. per bushel) will be obtainable for New Zealand apples.

(3.) Australian fruit has to pay a duty of M.1·15 (about 1s. 2d.) per case, but exporters have nothing to do with this duty, which is to be paid by buyers here, in addition to our sale price.

(4.) Enclosed you will find *pro forma* account sales, showing our charges, &c.

(5.) Our authorities do not require any certificate : the fruit is inspected here, and if free from San José scale no objection is made against importing the fruit. Up to date no signs of San José scale have been found on Australian apples.

The steamers of the Deutsch-Austral Dampfschiffs-Gesellschaft are not calling at New Zealand ports at present, but if there is a chance that lots of some importance will be shipped, we shall do our best to induce the D.A.D.G. to call at New Zealand ports in future.

For your guidance we beg to mention that the South Australian Government is honouring us with their confidence since many years, and is handing over to us all of their fruit for the Hamburg market. It will be a great honour for us if you will favour us with your confidence as well, and you may be sure that we shall always do our best in your interest. Please command us *re* any further information you should like to receive concerning the apple business.

Messrs. Garcia, Jacobs, and Co., Covent Garden, London.

We are in receipt of yours of the 6th ultimo, and learn that you have likewise written to our Liverpool and Glasgow houses. By to-day's mail we are forwarding the reply of our senior, Mr. Michael Simons, together with Liverpool's letter, to Glasgow, which embraces the answers from the three firms.

There are, however, one or two slight differences in regard to our market which come under paragraph 4. The expenses in London per case are a little heavier than is the case in either Glasgow or Liverpool—first, on account of the distance of the point of discharge to Covent Garden Market; the second, the market tolls which are levied on all goods coming to Covent Garden. Against this, however, we think the prices obtainable in London would more than cover the extra outlay.

We may mention incidentally that about three or four weeks ago some four thousand cases of apples from New Zealand were sold in London, and realised prices averaging about 7s. to 9s. They were not, however, disposed of on our market : otherwise the results would certainly have averaged, as mentioned by Mr. Simons, 8s. to 10s.

London would be the best place for pears and choice apples such as Cox's Orange Pippin.

Messrs. Simons, Jacobs, and Co., Glasgow.

Your communication of the 6th ultimo duly reached us. We are not surprised that the New Zealand fruit-export industry is now rapidly developing, and there is no reason why it should not assume greater or more profitable proportions than it has hitherto done.

The recent consignment of apples and pears to London did come under our notice, and there is nothing in connection with the development of the fruit trade but what deeply interests us, claiming as we do to be the most up-to-date handlers in this country.

We reply to your queries :—

(1.) There is a considerable opening in Glasgow for the sale of New Zealand fruit—more perhaps with apples than pears.

(2.) The price per bushel we should reckon from 8s. to 10s.

(3.) There is no duty on green fruit.

(4.) A consolidated charge to cover examination, lighterage, wharfage, cartage, &c. per bushel case would be 6d.

Messrs. Simons, Shuttleworth, and Co., Liverpool, to Simons, Jacobs, and Co., Glasgow.

We have received a letter, dated 6th May, 1910, from the Department of Agriculture, Wellington, New Zealand, and we understand that you have received a similar communication. Mr. Michael Simons, who is here to-day, suggests that this correspondence should be dealt with from the Glasgow office; we shall therefore confine ourselves to giving the information asked for, so that you may either incorporate it in yours or forward this letter with yours.

(1.) There is an extensive opening here for New Zealand apples. On the other hand there is only a limited outlet for pears in Liverpool, London being, in our opinion, the best market for that fruit.

(2.) It is impossible to say what price per bushel could reasonably be expected, so much depends on the quantities coming forward and the quality and condition of the fruit. Supposing that the New Zealand shipping season coincides with that of Tasmania and Australia, and that the fruit is similar in variety and quality, it might be interesting to mention that Tasmanian apples have sold at from 7s. 6d. to 10s. 6d. per box right along this season, the great bulk of the fruit fetching from 8s. 6d. to 9s. 6d.; while New York Pippins, the best selling variety here, made from 10s. to 12s., and sometimes as high as 14s. A few fancy apples such as Cox's Orange Pippin, Jonathan, &c., may be even higher prices, but only for small quantities.

(3.) The fruit would, of course, come in duty-free.

(4.) Our charge for handling this fruit would be 6d. per box, covering everything except freight and insurance, and our commission would be 5 per cent.

No doubt the New Zealand Department of Agriculture are well acquainted with the box that is used for the export business in Tasmania: of course what we have said as regards charges refers to fruit packed in a box of that description—say, not to exceed 56 lb. gross weight. Probably the Department have a similar package in mind when they refer to "bushel case."

Messrs. Edwards, Jacobs, and Sons, Covent Garden, London.

We are in receipt of your letter of the 6th May, and, in reply thereto, we consider that there is a great outlet both in London and Hamburg for good-quality New Zealand fruit. We now answer your questions as per your letter:—

(1.) We should not advise you to send pears to Hamburg; but for apples the market is especially good. No ordinary fruit must be shipped to that port—only the best quality. As regards London, as we have already said, there is a good outlet for apples and pears.

(2.) We consider 10s. about an average price for New Zealand fruit, but this entirely depends on the condition in which it arrives.

(3.) There is a duty levied in Germany on Australasian fruit at the rate of M. 5 (5s.) per 100 kilos (2 cwt.). The brokers have nothing at all to do with this duty in selling the fruit. The fruit is all sold in bond, and the buyers have to pay duty if they want to take the fruit out for the interior of Germany. But if they want it for export, there is no duty payable.

(4.) In London we make a consolidated charge, in addition to our commission of 5 per cent., of 8½d. per case of one bushel, which includes everything from steamer to Covent Garden Market except freight. In Hamburg the consolidated charge is about 1d. cheaper. The consolidated charge includes insurance.

J. B. Thomas, Covent Garden Market, London.

I have much pleasure in replying to your favour of the 6th May last, and to submit the following in reply to your queries:—

(1.) There is a favourable opening for New Zealand fruit on this market.

(2.) The price of a bushel case of apples should range from 8s. to 12s.

(3.) There is no duty levied on fruit.

(4.) The approximate inclusive charge per case is 9d., plus 5 per cent. commission, subject to a rebate on large consignments.

For your guidance I may also state that where goods are consigned free of all advances, and insured by shippers, we will allow a rebate of 4d. of the charges.

I have seen some very good samples of apples from New Zealand, as well as of a class that should not be shipped. The aim of shippers must be to send the best only, bearing in mind that the initial cost per case is the same for the best as well as for the inferior sorts, and, whereas the selected fruit will sell at 10s. to 12s. per case, the inferior quality

Pears require special care in selection and packing. The following varieties, landed in fair condition this season, realized as follows (I am giving the actual prices I have sold them this season *ex* "Runic"):—

Winter Nelis, 9s. 9d., 16s. 6d., 21s.
Josephine, 9s. 9d., 13s. 6d., 16s.
Comice, 19s. 6d., 21s., 33s., 46s. 6d., 48s.
Glou Morceaux, 10s. 6d., to 20s. 6d.
Maria Louise, 7s. 6d. to 15s.
Charmontel, 9s. to 13s. 6d.
Various (unnamed), 7s. 6d. to 21s.

All the above were packed in trays, three trays crated together making one package. They are all of uniform size, slightly larger than an ordinary apple-case, the above prices being for a package, each tray containing from thirty-six to sixty-four fruit. Vicar of Winkfield pears, 8s. to 10s.; other varieties in cases sold from 9s. to 16s. These cases were of the usual apple-case size.

I may mention that these prices were for fair quantities, and that arrivals in the earlier part of the season landed in wasty condition, and lower prices ruled for such.

Messrs. Hyslop and McDonald, Glasgow.

[No reply.]

Messrs. Lohmann and Co., Hamburg.

Letter was returned through the post.

[Letter.]

FROM T. W. KIRK, DIRECTOR OF ORCHARDS, GARDENS, AND APIARIES, TO THE BRITISH CONSULS AT—

Monte Video, Rio de Janeiro, Buenos Aires.

This country is rapidly developing a fruit industry, and I am venturing to ask your good offices in order to secure information under the following heads:—

(1.) What opening is there for the sale of New Zealand fruit, especially apples and pears, in your country?
(2.) What price per bushel case could reasonably be expected?
(3.) Is there any duty levied on apples and pears?
(4.) What, approximately, would be the usual charges for examination, lighterage, wharfages, &c., say, per bushel case?
(5.) Would it be possible to send a copy showing the exact wording of the certificate required by the authorities? The one which we have recently sent is as follows:—

"I certify that the fruit sent per [*Ship*] was grown at [*District*], New Zealand, and that the same, to the best of my knowledge and belief, is free from disease."

This is signed by the Government Inspector. Of course, full details of the marks are given.

I am posting you a copy of the last Annual Report of this Department dealing with the New Zealand fruit trade, and also a copy of the special fruit number of the *New Zealand Farmer*.

Trusting that you will pardon the trouble I am giving you, and that if there is anything I can do in return, you will not hesitate to command me.

The following replies were received:—

British Vice-Consul, Monte Video.

Apples and Pears.—There is a good opening for these in this country, provided that they are delivered in good condition. Hitherto pears have arrived in so bad a condition, owing to their delicate nature, that they have been unsaleable.

Price.—Apples fetch, wholesale, 7s. 6d. to 8s. per bushel case despatched, or 6s. to 6s. 6d. c.i.f. For pears no data available.

Duty.—Fivepence per bushel.

Lighterage and Wharfage combined.—Fivepence per bushel.

Certificate of Origin, &c.—None required.

Method of doing Business.—Fruit should never be sent on consignment on the chance of a sale. There is a fruit ring in operation here that refuses to buy goods not previously arranged for; in consequence, fruit arriving unexpectedly, and interfering with the calculations of the ring, has to be sold cheap for jams, &c.

Class of Fruit preferred.—The New York Pippin are recommended, as they keep best. The Alexandra class would realize higher prices than any other if they could be

delivered in proper condition; but they require special and most careful packing, which exporters hitherto have failed to give them.

Packing.—In addition to the above regarding the packing of the Alexandra class of apple, there is nothing to remark except that a good deal of pilfering on board lighters during discharge would be prevented if the cases were hooped.

Potatoes.—There is a good opening for potatoes. These would give, at a minimum, £4 per ton, c.i.f., or, say, £6 12s. after payment of all expenses, consisting of £2 2s. 6d. duty per ton, 6s. 5d. lighterage, and 3s. wharfage, &c. Pototaes should be packed in cases for this market. The best time for receiving them here is from March to August.

Correspondence in Monte Video.—Firms in New Zealand wishing to export to this country might communicate with the following firms in this city—of course, on their own responsibility: Messrs. Miles and Co., Avenida Rondeau 244; G. F. Adams, Ituzaingo 135; Gerardo Campos, 25 de Mayo 294.

Acting Consul-General, Rio de Janeiro.

(1.) As regard the possibility of the successful importation of New Zealand fruit, there is always a regular sale for apples in this market. I am told that pears are not imported, and "are not known in Brazil." One certainly does not see them as a rule, but they can be had; they are usually very small. I cannot ascertain whether they are home-grown or not.

Both apples and pears are extremely expensive, costing 400 reis (about 6d.) each in restaurants. Apples could certainly be grown in the highlands in the interior, where the climate is admirably adapted for them.

(2.) About 8s. per bushel is the price that might reasonably be anticipated.

(3.) The duty on apples and pears, calculated in gold, is 150 reis per kilo (about 2d. to 2½d.); on dried or treated apples, about 8d. to 9d.: with reductions of 14 per cent. when packed in cases or barrels, 17 per cent. when packed in flat barrels (ancoretas), 30 per cent. when packed in crates (paroleiras).

There is no reduction made when the fruit is packed in tins, bottles, wooden or card-board boxes, but the duty is then charged on the gross weight.

(4.) Lighterage and examination would work out at, say, 400 reis (6d.) per bushel.

(5.) As regards the certificate required by the local authorities, this must be issued by the doctor of the place of origin, stating that the fruit was shipped in good condition and free from disease, and this certificate must be signed also by the Brazilian Consul at the port of shipment.

What is meant is clearly that the doctor's signature must be legalized by the Consul, for the latter would certainly not sign a certificate respecting the truth of which he was entirely incompetent to judge. In the case of New Zealand fruit, this means that the signature of the Government Inspector must be legalized, since he issues the certificate.

I may add in conclusion that the Brazilian Government is making big efforts to develop the fruit industry of this country, but the success of their endeavours is problematical.

British Consul, Buenos Aires.

(1.) Hitherto the supply of apples from North America and Europe, not to speak of the local production, has amply fulfilled the requirements of the local market, so that there is no great demand for New Zealand fruit.

(2.) The price per bushel case is from 12s. 3d. to 13s. 3d.

(3.) There is no import duty.

(4.) The charge for examination, lighterage, wharfage, and freight from Monte Video amounts to about 4s. 2d. per case.

(5.) The certificate which you give is quite correct.

(6.) It will interest you to know that consignments of apples from New Zealand and Tasmania have been received here from time to time, and as a rule have been disposed of at the prices above mentioned.

It is customary to import fruit during the season that best suits the exporting country, and keep it here in cool-storage.

It has been found that pears do not carry well from New Zealand, the juiciness of the fruit preventing their being carried properly. The apples for this country must be of the best quality, and preferably should be of a hard nature to stand the long voyage.

I have to thank you for the Annual Report of your Department, and also for the copy of the special fruit number of the *New Zealand Farmer*, which you were good enough to send me.

It is very desirable that only the best quality of fruit should be sent.

GOVERNMENT GUARANTEE ON EXPORTED APPLES.

THE Minister of Agriculture and of Industries and Commerce has issued a notification that it has been decided that the Government will guarantee exporters of apples from New Zealand to Europe against loss on the following conditions :—

1. The varieties of apples shall be Ribstone Pippin, Cox's Orange Pippin, Alexander, Wellington Pippin, Scarlet Nonpareil, New York Pippin, Monroe's Favourite, Cleopatra, Jonathan, Rymer, Alfriston, Adams's Pearmain, Esopus Spitzenberg, French Crab. Sturmer, and other varieties approved by the Department's Inspector.
2. They shall be packed and graded to the satisfaction of the Inspector.
3. They shall be exported in Tasmanian or Peacock cases.
4. They shall be shipped in cold-storage.
5. Exporters shall make their own arrangements for shipment to and sale in Europe.
6. The High Commissioner's officers shall be given facilities for inspecting and reporting on the fruit after arrival, and on the sale thereof.
7. The amount guaranteed to each grower shall be the net return of 1d. per pound on the fruit forming his part of the shipment.
8. The total amount guaranteed by the Government shall, however, not exceed £315 (being the amount claimed in respect of last year's shipment) ; and if that sum does not yield 1d. per pound to each grower, it will be distributed *pro rata* according to the amount that would be due to each grower had the basis been 1d. per pound without the total amount being limited.
9. In calculating the amount to be deducted for expenses, New Zealand freights and wharf charges, also cost of wrapping-paper, shall be taken into consideration, but the cost of the case and the labour employed in packing shall not be taken into occount.

FRUIT-CROP PROSPECTS.

APPENDED are telegraphic reports, dated 21st December, 1910, received by the Division of Orchards, Gardens, and Apiaries concerning the prospect of the fruit crops throughout the Dominion :—

Auckland North.—Pears average ; applies and plums below ; peaches above.

Auckland South.—Pears slightly lighter than usual ; all other crops good.

Hawke's Bay and Wellington East.—Apples and pears moderate to good crops, except where caught by frost ; peaches, nectarines, and apricots scarce ; small fruits about half a crop ; tomatoes and garden-produce backward on account of drought ; disastrous frosts, October, responsible for shortage. The Hawke's Bay Fruit-growers' Company estimates the output

from its members' orchards at—stone-fruit 20,000, pip 13,000, small fruits 7,000 cases.

Taranaki and Wellington West.—Apples good; pears good; peaches light to moderate; apricots nil; plums, Japanese heavy, English moderate; small fruits moderate.

Nelson.—Apricots very heavy all through; peaches heavy to medium; nectarines heavy; plums heavy; pears medium; apples, some places light, taken all through a fair average crop.

Marlborough.—Apples, apricots, peaches, and nectarines, good average crop; pears good; plums, European light, Japanese good; bush fruits good, except raspberries poor.

Canterbury and Westland.—Apricots and peaches good crops but very few grown; apples, pears, plums, and strawberries light; cherries, raspberries, and other small fruits medium.

Otago and Southland.—Apples and plums light; apricots, peaches, and pears good.

THE WAIKATO SHOW.

THE following is a list of awards obtained by stock from the Ruakura Experimental Farm at the Hamilton Show, 1910:—

HORSES.

Draught mare	1st and Champion.
Mare in foal	2nd.
„ dry	1st.
Pair of horses	1st.
Team of three horses	1st.
Colt, 2 years	2nd.

CATTLE.

Shorthorn dairy bull, over 2 years	1st.
„ „ 1 year	1st.
„ heifer, 3 years	2nd.
Two Shorthorn heifers, 1 year	3rd.
Cow, any breed	V.H.C. and H.C. (16 competed).
Two grade Ayrshire heifers, 1 year	1st.
Ayrshire bull, 2 years	2nd.
„ „ 1 year	3rd.
„ heifer, 3 years	2nd and Commended.
„ „ 2 years	2nd and 3rd.
„ „ 1 year	H.C. (8 competed).
Jersey bull, 1 year	2nd.
„ heifer, 3 years (bought at Mr. Day's)	1st and 2nd.
„ „ 2 years „	1st and Reserve Champion.

SHEEP.

Southdown ram, 18 months	1st, 2nd, and Champion.
„ ram under 18 months	1st and 2nd.
„ two rams under 18 months	1st and 2nd.
„ three ewes under 18 months	1st, 2nd, and Champion.
English Leicester ram, 18 months and over	1st, 3rd, and Champion.
„ three ewes under 18 months	H.C.

A ram and ewe each of the Dorset Horn and Ryeland breeds were exhibited, and received certificates of merit. There were no classes for these breeds.

THAMES MUNICIPAL ABATTOIR.

This abattoir is one of the most up-to-date of its size in the Dominion. Contract price, including pens and races, drainage system, &c., £2,200.

POULTRY-KEEPING.

[By F. C. BROWN, Poultry Instructor.]

(Continued.)

FEEDING.

THE LAYING FLOCK.

WHILE it is desirable that poultry-keepers upon a large scale should be acquainted with the constituents and food-values of the various feeding-materials, it is not necessary that time and trouble, and often money, should be spent in devising a strictly scientifically balanced ration for their flocks. It is practically impossible to prepare a mixture of ingredients which will comply with scientific rules and at the same time satisfy all the requirements of the different birds, amongst which there cannot fail to be considerable variation in egg-laying power as well as in other points. The best results can be obtained by plain feeding of foodstuffs, the various materials being fed separately, allowing each bird to balance her own ration.

The best system of feeding to follow for flocks of fowls in full laying is as follows: In the morning a plain mash, made up of two parts pollard and one part bran, by measure; the proportions may be varied according to the quality of the pollard. A full crop of hard corn on a cold morning will not give much nourishment or heat to the system for several hours. At midday meat in the proportion of 1 oz. (cooked) to each bird. Green feed, such as watercress, cabbage, lettuce, mangolds, clover, or lucerne, to be fed during the day. For the evening meal, wheat, for which oats may be substituted on alternate days; and in cold weather maize may occasionally be given. Sharp gravel grit and crushed oyster-shell should always be before the birds, and also fresh clean water.

The same system may be adopted in the feeding of breeders, but the quantity of meat must be considerably reduced, or the birds will be liable to be overforced, and trouble will be met when hatching and rearing the chicks: the chickens are apt to be weak. High laying records should not be looked for in a breeding-pen.

The whole of the material of the mash should be moistened with meat-soup, and mixed to a crumbly condition, not sloppy. It should be fed in troughs, not on the ground. The troughs must be kept clean and sweet, food not being allowed to accumulate or become sour.

Boiled meat is the best form of animal food. Reliable brands of dried blood, or meat-meal, given in moderation, are good substitutes. Birds on a free range find a considerable quantity of animal matter in the form of insects, but when in confinement this must be replaced by meat, dried blood, or meat-meal. The number of eggs laid is influenced by the quantity of meat fed.

Wheat is the staple grain food for laying-fowls, but the price of the different foods shall be considered. Maize is a good winter food, if used in moderation. In all grain for fowl-food it will be found that the best quality is the most economical.

Skim-milk is one of the best egg-producing foods. A good method of using it is to let it sour, pour off the whey, and boil the curd, or the milk may be given in liberal quantities for the fowls to drink. During the spring and summer months, the natural laying season of birds, milk may take the place of animal food, but to produce a good yield of eggs in winter an ample supply of animal food is necessary.

Pullets should not be forced to maturity, as is often the practice with late-hatched stock. They should be kept steadily growing. Forced maturity almost invariably means small eggs; and late-hatched birds are most susceptible to disease, and the most frequent cause of outbreaks. Condiments and spices no doubt force pullets to early laying, but they do not increase the yearly output, so that in the long run the money spent upon them is thrown away. Records should not be based upon the summer laying; the year's total is the only guide. After feeding the early-laying pullet on wheat for a time a change to oats or barley is likely to bring on a moult, and winter eggs will be lost—in fact, the sudden changing of any method of feeding or quarters during the autumn or winter months will not only check egg-production, but will also throw the birds into moult. If fowls require a tonic, give them a good supply of watercress.

It is not well to follow nature too closely in the matter of feeding the laying hen. Under natural conditions poultry only produces a small number of eggs in a year; high records are artificial, therefore artificial treatment is necessary to obtain them.

Sea-shell is not grit, but consists principally of lime, and the bird quickly dissolves it in the gizzard. An ample supply of sharp gravel-grit is required as well. Fowls have no teeth, and require sharp grit to grind the food in the gizzard.

When green food is not procurable, allow one packet of Epsom salts dissolved in water twice a week for every sixteen fowls when mixing the mash.

As regards the quantity of food necessary for a given number of fowls, no definite rule can be laid down. Give the birds as much as they will eat at each meal, without waste. It is a mistake to stint the fowls; this is often the cause of failure to lay. The good layer will not eat more than she requires if fed regularly; she will turn the food into eggs. The poor layer will turn it into fat. A bird that has to be fed a reduced ration and the food scattered in a deep litter in order to prevent her from becoming too fat should have no place on an egg-farm. The best laying hen will become exhausted much sooner than a drone, and should not be made to expend her energy in scratching in deep litter for food. The good layer is generally active, and does not fatten so quickly as the drone. The good layer will consume three times as much meat and oyster-shell as the drone, but the overfeeding of nitrogenous matter is bad for breeders, leading to weak chickens.

By keeping the fowls sheltered from rain and wind food is saved. Heat to dry the birds when wet and to ward off the cold must come from the food.

The "dry-mash" method of feeding is still on its trial. It has been established that a medium number of eggs can be obtained from birds fed with a dry mash of grains with meat or blood-meal, and growing stock also thrive on it; but for heavy egg-production boiled meat should be fed

separately, and, so far, the moist mash has given better results. Blood-meal and meat-meal are of a too concentrated form, and when overfed for the purpose of forcing egg-production ovarian troubles are certain to follow. The dry mash is composed of pollard and bran, or dry grains, with blood-meal or meat-meal, no moisture being added. Two parts pollard, one part bran, and 5 per cent. of a good grade of any blood-meal makes a good ration, the proportion of blood-meal being reduced for growing birds and breeding-stock. The mash must be fed in a hopper, kept always before the birds. The birds must be fed in the evening with whole grain in the usual way.

The advantage of the dry mash as against the moist mash is in the minimizing of labour in feeding.

During the period of moulting the bird has a great strain upon its system, and it should have ample food of the best and most nourishing nature, meat being the best of all. A handful of sulphur mixed in the mash is very beneficial.

TABLE-POULTRY.

The raising and feeding of table-poultry is an almost neglected branch of the industry in New Zealand at the present time. Egg-production is the sole object, and the cockerels and cull hens are regarded as a by-product —often as a waste product. If the male chicks could be distinguished at the time of hatching they might be treated as are the male calves of the milking-breeds of cattle—instantly destroyed ; but in practice all the chicks must be reared to an age of several weeks before the sexes can be distinguished, and if care continues to be given to the cockerels they can in a short period be converted into a profitable by-product. The chief laying breeds of fowls will not develop into a choice table carcase, but if properly fed they will pay handsomely for the treatment. A well primed bird, even if of the extreme laying type, is worth two of the same kind not primed. There is nothing but loss in keeping cockerels after they can be picked out, or, worse still, allowing them still to run with the pullets, and sending them at several months old to market in unfattened condition. The ordinary 3 lb. bird sent to market consists of about 6 oz. of bone, 18 oz. of offal, and, perhaps, 1 lb. of meat. If a fraction of profit can be realized by producing such a frame, a very handsome profit can be made by fattening for twenty-four days, when the frame should carry 40 oz. or more of fine flesh. It costs much less to produce a pound of flesh than a pound of frame, and it will pay the grower to prime his poultry, just as it pays to prime other classes of stock.

Still more responsive to fattening treatment are fowls of the heavier breeds, of which there are egg-laying strains, such as Wyandottes, Orpingtons, and Plymouth Rocks. These, properly primed, are first-class table-fowls. While the market price of eggs maintains the level of the years 1906–10, eggs will be the more profitable product, and the White Leghorn will be the best business breed ; but if eggs fall to low prices, the meat qualities of the various breeds will have to be considered. The respective types, egg-laying and meat-producing, were described and illustrated in a previous article (*Journal*, December, p. 487). It may be repeated that, as a general rule, the high-class layer is not a good table-bird. It seldom carries the desired flesh on the breast ; and, whilst the good layer must have a short breast-bone, in order to allow room for abdominal development, the

choice table-bird must have this bone as long and as deep as possible, so as to carry the length and depth of breast-meat. On this point the Dorking stands out by itself. The carver can take long slices off the breast, and cut and come again.

The best time to begin fattening chickens is when they are about three months old. If they have been well fed up to this age they will be found with good frames and in a more or less plump condition; but when kept longer they begin making feathers and bone, and are not then in fair condition again until they reach a matured stage. This will be readily understood when it is considered what a drain there must be on the bird's system in producing the thousands of feathers that nature demands. Another important point is that of separating the sexes at an early age. This should be done as soon as the sexes can be determined. Birds to be economically fattened must be kept absolutely free from vermin. Even if no insect-life be observable, each bird should be well dusted with, say, carbolic powder and sulphur, and the houses and pens sprayed with a strong disinfectant.

Once the fattening process has commenced, exercise must be first curtailed and afterwards altogether prevented. It is not advisable to coop the birds unless they are to be crammed by machine, as they are apt to fret and lose instead of gaining weight. As a rule ten days' trough-feeding and fourteen days' cramming will make a bird prime. During the first ten days they should be confined to a small run, so that there may be little scope for their activity. The nature of the food supplied at this stage is very important. Only soft food should be given, and fed sparingly for the first two days; hard grain cannot be digested with the limited amount of exercise.

The following mixture is recommended for the trough-feeding period (ten days): 100 lb. ground oats, 50 lb. ground wheat, 10 lb. maize-meal, 5 lb. blood-meal, and 1 lb. salt, the whole being mixed with milk or soup into a crumbly mass. After the first two days feed three times a day all the birds will eat up clean. Grit and green food should be fed separately, and milk, or skim-milk, when these are available, be given to drink three times a day. Under these conditions the birds will go to their perches, sleep, and grow fat.

When the birds have been under trough-feeding for ten days, if they are to be crammed, they should be placed in the cramming-coops, each bird by itself in a compartment measuring roughly 12 in. wide, 15 in. high, and 18 in. deep. The same food as mentioned for trough-feeding can be used for cramming with good results, but there are many mixtures of ground grain that will be equally satisfactory. In all cases the grain must be ground fine for cramming, or the mixture will not run through the tube. To facilitate the passage of the mixture through the tube the addition of a little porridge or pollard is helpful. The amount of maize may be considerably increased, but the objection to its use is that when given in excess it forms too much fat which is of a bad colour, and renders out when cooking. White, delicate flesh is what should be aimed at. The birds are fed twice a day, at 6 in the morning and 6 in the evening. No grit, green food, or drink is given. Immediately the feeding is done curtains are pulled down over the front of the coops and the birds are kept in darkness and as quiet as possible. As with the trough-feeding, the food should be given sparingly for the first few days.

CRAMMING POULTRY.

In cramming, the bird's body is caught between the arm and the side of the operator, the bird being on its side. The neck is held straight out, and the first finger and thumb of the disengaged hand open the mouth, which then slips on to the tube of the machine, the tube going right into the crop. A simple pressure by the foot forces into the crop the cramming-mixture. On the ordinary cramming-machine there is a check-screw which regulates the amount of food driven out of the tube with each pressure of the pedal by the foot, but an expert operator may prefer to work without this mechanical guide, determining when the bird has had enough by using his right hand, held over the crop, as a gauge, so that birds differing in capacity can be crammed according to their individual requirements. Birds can be crammed at the rate of several hundred an hour, the time for each bird being four to five seconds from taking it in hand to returning it to the assistant.

If the birds are not to be finished by cramming they should be confined at the end of ten days to a still smaller area or in coops, and fed with a mixture similar to that used for cramming, and for a similar period, the food being given in small troughs, and the utmost care being taken of the cleanness of all vessels as well as the coops or enclosures.

The most profitable way of dealing with Leghorn and similar cockerels is to prepare them at the age recommended, and place them in cold-storage to await the best market.

Caponizing is not recommended: it would not be profitable for New Zealand markets.

THE WEATHER AND AGRICULTURE.

[By D. C. BATES, Director of Meteorological Office.]

DECEMBER.

RAINFALL FOR DECEMBER, 1910.

Departure from Normal for the Month, + above, − below.	Station.	Total Fall.	Number of Days Rain fell.	Maximum Fall, and Date.
	North Island.			
In.		In.		In.
+ 0·67	Pakaraka	3·90	12	1·10 on 1st.
− 0·02	Auckland	2·83	19	1·07 „ 2nd.
− 0·11	Waiuku	3·71	20	0·75 „ 25th.
+ 0·96	Waihi	6·20	19	2·26 „ 17th.
+ 0·55	Hamilton	4·24	17	1·14 „ 16th.
− 0·68	Gisborne	2·10	11	0·58 „ 16th.
− 0·50	Meeanee	2·04	13	0·46 „ 10th.
+ 2·66	New Plymouth	6·79	18	1·78 „ 16th.
− 0·45	Inglewood (Taranaki)	7·22	18	1·38 „ 14th.
+ 1·32	Wanganui	3·75	17	0·64 „ 14th.
− 0·50	Levin	2·62	16	0·57 „ 9th.
+ 0·29	Wellington	3·59	15	1·08 „ 9th.
	South Island.			
− 0·61	Nelson	2·26	14	0·57 on 9th.
− 0·78	Hokitika	10·20	11	1·92 „ 6th.
− 2·14	Okuru	10·50	12	2·72 „ 19th.
+ 0·88	Lincoln	2·88	10	1·07 „ 8th.
+ 0·82	Kapunatiki	2·88	12	0·94 „ 8th.
− 1·22	Oamaru	1·26	6	0·44 „ 12th.
− 0·94	Balclutha	1·64	8	0·42 „ 30th.
− 0·11	Dipton	3·80	12	0·92 „ 11th.
− 1·93	Invercargill	2·39	14	0·50 „ 28th.

NOTES.

The sun reaches its southernmost declination and nearest approach to the earth about the 22nd December, and astronomically this would be considered the height of summer in the Southern Hemisphere; but, as the heat of the earth and atmosphere goes on accumulating, the height of summer comes later in a meteorological sense, and summer is roughly taken as only commencing with December as its first month.

This year the weather during the month has been warm and mild. The barometer was below the normal from the 5th to the 27th, and during that period electrical disturbances and frequent showers were much in evidence. Though the rainfall was generally below the average, some returns are

exceptional for heavy falls accompanying thundery conditions in various parts. Thus, at River Bank, Napier, on the 10th, 2·40 in. of rain fell in ninety minutes, and comprised nearly the half of the total fall for the month at that place.

The month opened with the advance of an ex-tropical disturbance in the far North, for which the barometer fell $\frac{6}{10}$ in., while at the same time it rose in the southern districts.

A disturbance, which had travelled with decreasing energy from the westward, enveloped the country on the 6th with mild and humid conditions, and heavy rain in parts, especially on the west coast of the South Island. The barometer afterwards continued unsteady, with frequent changes. On the 20th the barometer was very low in the far South, and stormy weather prevailed southward of New Plymouth and Napier. Barometric pressure increased until the 23rd, when a rapid fall took place in the South, and was accompanied by high northerly winds and stormy weather. 29 in. of barometric pressure was recorded at the Bluff on the morning of the 24th, after which the barometer rose steadily with strong southerly winds, but, fortunately, with very pleasant weather generally for the holidays. On the 27th the barometer was above normal, but afterwards fell only $\frac{1}{4}$ in. through a few hours. In the rear of this small area of low pressure was cold, squally, and disagreeable weather, which particularly affected the east coast between Castlepoint and Kaikoura—effects which were in marked contrast to those which accompanied the steady rise of 1 in. barometric pressure on the 25th and 26th after the storm on Christmas Eve.

DISTRICT NOTES.

Whangarei Heads.—The month of December was a very dry one, this making up for the surplus amount we received in the preceding month. Crops are coming on fine, and the grass has more substance in it.—(*F. J. McKenzie.*)

Auckland.—A muggy humid month, with a wonderful growth of vegetation. No storms of any consequence, and no particularly heavy falls of rain on any one day.—(*T. F. Cheeseman.*)

Te Aroha.—Plenty of warm rain, favourable from an agricultural point of view. All vegetation coming away rapidly.—(*G. F. McGirr.*)

Athenree (*Tauranga*).—The rainfall in this district has been exceptionally heavy for the month of December. We had rain on 16 days, totalling 6·30 in., as compared with 6 days with rain in December of last year, totalling 1·44 in. Dry weather is much needed now in order to save the crops.—(*W. Salter.*)

Rangiahua (*Hokianga*).—A very windy month. Grass has been very plentiful, but owing to the winds the moisture is completely drawn out of

the dug ground, and it has been difficult to raise small seeds such as carrots, parsnips, onions, &c. Potatoes seem to be generally blighted in the district.—(*W. R. Coxhead.*)

New Plymouth.—A warm month with plenty of rain. About the middle of the month we had some very rough weather, the rivers overflowing their banks, and the seas exceptionally rough. Farmers complain that owing to the heavy rain the potato-blight is increasing in virulence.—(*W. Fletcher.*)

Weraroa Experimental Farm (Levin).—This month has been a rather disappointing one to the farming community around Levin. Rain fell on sixteen days, and, though the falls were only light ones and refreshed the ground very little, they were sufficient to cause the harvesting to be considerably interfered with. A heavy hailstorm on the 10th did a little damage to the oat crops. Very few high winds were recorded, and if the rain had only left off a while, harvesting would have been carried out in record time. —(*H. Huntington.*)

Waitatapia (Bull's).—Very wet for December; brought on late crops wonderfully; stopped shearing.—(*W. W. Dalrymple.*)

Waituna West (Feilding).—The first week in December was ideal weather, then it broke, and has remained broken since. The rainfall has not been heavy at any time, but it has been pretty constant. Before the break farmers were getting a little afraid of the dry weather; since then they have been grumbling, not at the quantity, for they would have liked more, but the time it has taken over it. Quite a number were caught at the finish of shearing with a day or two more to go, and it took them nearly a fortnight to finish. Lamb-shearing and haymaking are now in hand, and unless the weather takes up they are likely to remain there some little time. On two days there were light dashes of hail. 1910 has been singularly free from hail, for some reason or other. At times it has been rather cold.—(*J. Guylee.*)

Ditton (Masterton).—Very good rains. The country, which was very dry in the spring, has now quite recovered. A frost was recorded on the grass on the 28th. Mean maximum temperature, 1° below last month.—(*S. Mawley.*)

Meeanee (Napier).—The weather was unsettled for December. The number of days on which rain fell was much in excess of that for the corresponding period of the two previous years, but the total rainfall was much below the average. Most of the rain fell between the 8th and the 16th instant. Thunder on the 8th, 9th, 10th, 11th. The barometer was about the average for December, while all the temperatures were slightly lower than those of the last December. The barometer was, however, exceptionally low on the 17th—being the lowest on record for Meeanee. The temperatures on the grass reached freezing-point on the morning of the 30th—an unusual occurrence for December. There was the average amount of bright sunshine. The velocity of the wind on the 16th was the greatest on record at Meeanee for December, and was exceeded twice only during 1910—viz., 2nd and 22nd July.—(*Dean Smyth, S.M.*)

Eketahuna.—More like a spring than summer month. Pasture still green, and abundance of it, everywhere in this district.—(*J. T. Quinn.*)

Annedale (*Te Nui*).—There has been 93 points more rain this year than last, being 47·63 in., on 157 days, being sixteen days fewer, There has not been much drying weather, and the creeks and dams are full, having kept up their normal height through the past nine months. There is a good growth of grass, and white clover is plentiful, and all stock doing well. We have not had either the extremes of dry weather nor flood experienced in other parts of the Dominion.—(*H. A. Nevins.*)

Pahautanui.—The weather during the past month has been summer all through. The highest temperature was on the 18th and 19th, 70° and 71° respectievly being recorded. The rain which fell on the 21st and 23rd produced a humid warmth. This caused potato-blight, though not in a very virulent form. The apple crop promises to be heavy, and codlin-moth is kept well down through the efforts of the Department concerned. The frequent rains have kept up a splendid supply of feed.—(*J. Pearce.*)

Timaru (*Marlborough*).—An unusually wet month for the time of the year. Owing to the constant showers the barley was discoloured before it was cut, and I fear there is not a bright sample in the district. — (*R. F. Goulter.*)

Mackenzie (*Cheviot*).—The first week of December was fine and extremely hot, and heavy rain was experienced on the 8th and 9th. On the 12th a heavy thunderstorm passed a few miles south from here, travelling from west to east, and turning north when at sea. The wind changed from north-east to south-west at 2 p.m., changed again to south-east at 2.30 p.m., changed again to south-west at 4 p.m. with heavy rain and wind. Brilliant forked lightning could be seen during the progress of the thunderstorm. An extremely heavy hailstorm followed, and cut down crops as if they had been mown down, but the trail was not broad.—(*A. C. Bellwood.*)

Methven.—The rain which fell on the 8th and 12th came at a most opportune time, as the grain crops were beginning to feel the want of moisture. The result is that the grain crops are expected to give a much better yield than last year, and the prospects in this district are very good.—(*J. Carr.*)

Hanmer Springs.—The weather was a good deal unsettled during the month. There was a fall of hail on the 28th instant, and a dusting of snow on high country. Some of the oat crops have been harvested, and others are looking in good condition.—(*S. J. Collett.*)

Christchurch.—North-east and south-west winds generally prevalent throughout the month. An average rainfall.—(*H. F. Skey.*)

Otahuna (*Tai Tapu*).—A very windy month.—(*R. Heaton Rhodes.*)

Pleasant Point (*Timaru*).—The rain which fell in the early part of the month made a great difference to vegetation of all kinds, the burnt appearance of the grass paddocks giving place to a fresh green in the course of a few days, while the grain crops took a fresh lease of life, and will now be well filled, although short in the straw. The latter end of the month has been hot and windy, notably on the 24th, when it blew hot and strong from north-west from morning till night. Another good rain would now be welcome, especially for root crops and grass. Harvest has commenced, and will be general in about a week or ten days.—(*J. Bishop.*)

Waimate.—Dry conditions of previous month prevailed until the 17th, when a thunderstorm brought welcome rain. Since then the weather has

been unsettled and broken. On the 17th there was a good rain. A short dry spell occurred between the 15th and the 24th, and detracted from the beneficial effect of the previous rains. Many of the crops, however, have recovered wonderfully, and prospects are fair for harvest in the localities where the crops had withstood the worst effects after drought. The country generally, however, is still very dry.—(*W. M. Hamilton.*)

Totara Estate (*Oamaru*).—The rainfall for the year was 16·41 in., but during the farmer's cropping season, from April to December, it was only 10·95 in., and to make matters worse the evaporation must have been very great. Immediately after any rain-showers fell during the year a strong drying wind always sprang up and quickly evaporated the moisture.—(*J. Macpherson.*)

Leith Valley (*Dunedin*).—Rather rainy month.—(*H. Skey.*)

Bushey Park (*Palmerston South*).—The frequent showers which fell during the month did an immense amount of good to the crops, but this was to some extent discounted, especially as regards the pasture, by the very drying winds that so often followed them. On Christmas Eve there was a gale that wilted the very weeds. Rape and turnip crops promise very well indeed, and grain crops, though below the average, are expected to yield much better than seemed likely a month ago.—(*Mrs. J. J. McKenzie.*)

Roslin Estate (*Woodlands*).—Splendid growing weather.—(*J. D. Trotter.*)

DRAFTING SHEEP AND LAMBS, CRAIGIEBURN STATION, CANTERBURY.

TRADE WITH ARGENTINA.

PROSPECTS AND CONDITIONS.

IN his final report to the Department regarding the New Zealand exhibit at the Argentine Exhibition and the prospects of trade with Argentina in New Zealand products, the Trade Representative states that the bulk of the seeds and grains were distributed amongst estancieros who were interested and asked for them. Samples of seeds, hemp, twine, &c., were also presented to the Agricultural Society, from which warm thanks were received. The kauri-gum and timber exhibits were being taken on to New York.

Regarding the main object of his mission to Argentina—namely, the promotion of an export trade to that country from New Zealand—Mr. Gow states that no stone has been left unturned to secure information bearing on the matter. The knowledge acquired by him leads him to express his confidence that a splendid market exists in South America for New Zealand apples, jams, preserves, hops, hemp, rope, and timber, providing that these products can be landed at a price that will enable them to compete with goods from other countries.

At the present time several shipping companies are engaged in the trade from European and North American ports, and freights from these are at a fairly low figure, the goods being landed right at the docks in Buenos Aires. Products from New Zealand, on the other hand, have to be transhipped at Monte Video and brought on to Buenos Aires by river-boats. The latter are all under the flag of one company, which, having the monopoly, charges very stiff freights. Could this drawback be removed, Mr. Gow is confident that South America offers one of the best markets in the world for the New Zealand products mentioned above.

The market for woollen goods is not so promising. All wool articles are subject to a heavy duty, which, added to the river freights, transhipping dues, &c., would place the goods in the hands of the retailers at almost prohibitive prices. Woollen materials containing only a slight percentage of cotton mixture are admitted at a low duty, and the market is supplied from North America, England, and Germany. The latter country has the bigger hold, as a result of the lenient terms allowed by German firms, compared with those given by others. The Germans very often allow twelve months' credit, and this is an arrangement against which English and North American firms cannot compete.

The market for New Zealand grass-seeds should develop into a good one if properly worked. The heavy duty on grain such as wheat, barley, oats, &c., precludes the possibility of a profitable business being due in those lines even if a demand existed. Building-stone is plentiful in various parts of the Argentine and Uruguay, and thus the chances of an opening for Oamaru stone are small. There is absolutely no market for kauri-gum.

Should arrangements be made for the supply of apples from New Zealand, other produce such as cheese, potatoes, hams, bacon, poultry, eggs, &c., could be introduced in due course, and the opinion is given that the field would prove in time to be an unlimited one for all these articles.

To successfully establish business relations, New Zealand exporters must have a representative in Buenos Aires. Such representative, moreover, must speak the language of the country (Spanish), have a thorough knowledge of existing conditions and Customhouse work, and be able to arrange freights from Monte Video. Intending exporters are warned not to ship goods to Argentina on consignment unless they have a responsible representative to attend to their interests.

CROPS, PASTURES, AND STOCK.

THE climatic conditions of the past month have been generally favourable, although there has been in many of the South Island districts an excess of strong drying winds. Grain crops generally made good progress, and harvesting in the North Island is (10th January) well advanced, and in Canterbury has well begun. The season is about a fortnight earlier than last. The crops are very irregular in yield. Estimated yields for the several districts and the Dominion are tabulated on page 56. The condition of the grain will vary greatly, but promises to be on the whole better than last season. There are reports of a large proportion of failures of germination of turnips, but crops in which there has been a good braird are coming on well. Pastures have made a fair recovery, excepting where the destruction by drought was complete, and where the wind has neutralized the effect of the rain. More rain is needed in some districts. The grass-seed crops in Canterbury and Hawke's Bay are extremely light, but on the West Coast, North Island, and in Southland are, with few exceptions, good. Lambs are reported to be still light, as a consequence of the dry spring, and milking-cows in many districts are still yielding below the average supply of milk; but with the improved condition of pastures better returns are expected to be realized shortly. The situation all round is favourable.

PERENNIALIZED ITALIAN RYE-GRASS.

THE reply in the *Journal* (November, p. 450) to an inquirer in regard to this grass has elicited the information that Messrs. Gartons (Limited) have New Zealand agents, Messrs. Wright, Stephenson, and Co., Dunedin. The price this year for seed of this grass in New Zealand was 19s. 6d. per bushel of 20 lb.

It is observed from the reports forwarded from Messrs. Gartons that this grass is an enormous hay-producer, is very rapid in growth, and for dense succulent herbage is unrivalled. It is claimed as marking the advent of a new series of breeds of forage crops that will be offered to the agricultural community by those enterprising seed-breeders, Messrs. Gartons (Limited).

CORRESPONDENCE.

FEEDING-VALUES OF GRASSES.

A. D. W., Homewood, asks,—

Would you kindly give, in the next *Journal*, the relative feeding properties of *Danthonia semiannularis*, *Festuca durius* var., *Festuca angustif*, *Agrostis vulgaris*; also, is the latter suitable for dry ground?

The Biologist replies as follows :—

Danthonia Semiannularis.—There is considerable divergence of opinion on the feeding-value of *Danthonia*, but it can be ranked as a fairly nutritious grass, and highly suitable for sowing in localities where better herbage, such as cocksfoot and white clover, will not thrive. This grass varies to a remarkable degree, many of the forms being far more valuable for pastoral purposes than others.

Chewing's Fescue.—This grass is a form of red fescue (*Festuca rubra*), and its origin is uncertain. Its name has been derived from a southern farmer who was amongst the first to sell seed of this grass in Southland. At the present time it is looked upon as a valuable grass for dry, poor soils, but should never be sown on land that will be broken up in a few years' time. Its feeding-value is slightly inferior to the better-class forms of *Danthonia*, but it gives a larger yield of herbage. A considerable amount of seed is exported annually to Europe, where it is marketed as *Festuca rubra*.

Festuca angustifolia.—A form of fine-leaved sheep's fescue. This is a useful bottom grass in mixed sheep-pasturage, and is highly nutritious, being little inferior to cocksfoot. The yield, however, is small, except in favoured localities, and it will not endure prolonged drought.

Agrostis vulgaris.—A valuable grass for second-class lands. It gives a large yield of herbage superior in feeding-value to either *Danthonia* or Chewing's fescue. Its chief objection is that it grows very scantily during the winter and spring months. Waipu Brown Top and Matakana Red Top are both local names for *Agrostis vulgaris*. It succeeds well on poor land, but requires a considerable amount of moisture. I would not advise its use in localities where the rainfall is less than 40 in. per year. Seed is difficult to secure true to name, the majority of European samples containing several distinct forms of *Agrostis* mixed together. American seed is generally more reliable, there being a large demand for this grass in the United States.

SEED-MIXTURES FOR BUSH BURNS.

H. P., Blenheim, writes as follows :—

Could you inform me through your *Journal* what would be the most suitable mixture of grass-seed to sow on bush burns in the Tamaki district, Dannevirke; also what quantity of turnip and rape seed could be sown without injuring the grass in any way; also the most suitable varieties. The land is flat, and a rich alluvial overlying shingle, but stony in places.

The Director of Fields and Experimental Farms replies,—

On land of the description mentioned, rich alluvial flats, the grasses usually availed of are—Rye-grass, 15 lb. to 20 lb.; cocksfoot, 7 lb. to 10 lb.; clovers, 3 lb. to 4 lb.; and rape or turnips, 1 lb. to 2 lb. The turnip or rape seed is sown with the intention of enabling a considerable number of stock to be depastured on newly burnt land, in order that the fresh growth of scrub may be crushed and prevented from re-establishing itself. It often happens in suitable localities that quite a valuable crop of rape or turnips results. No injury need be anticipated to the grass. The correspondent is at the same time very much recommended to acquaint himself with the practice obtaining in the district referred to. It often happens, from peculiarities of climate, land, &c., conditions are varied, and very sharply so in certain localities. We are not acquainted with the farm in question, hence the recommendation that local experience should not be overlooked.

FLAX-WASTE FOR MANURE.

J. W., Waimea West, writes as follows :—

I should like, through the medium of the *Journal of Agriculture*, to ask what manurial properties there are in flax waste or pulp. On my farm a few years ago a flax-mill was working, and where the pulp was scattered over the ground the corn (barley) grows and yields better than elsewhere. From my observation and experience my land is deficient in humus or vegetable matter, which accounts for a spell of dry weather retarding and withering the growth of the crop. Would you kindly state in the next issue of the *Journal* what flax-pulp contains. I should think it contains a fair percentage of nitrogen. In answer to a correspondent, I saw that a list of manures and their analyses is being prepared, which will be a great benefit to the farming community. Will it be published in the *Journal of Agriculture* ?

The Agricultural Chemist supplies the following reply :—

An analysis of flax-waste given in the 1904 Annual Report, page 137, showed that the dry matter contained—ash, 6·34 per cent. ; nitrogen equal to ammonia, 0·74 per cent. ; phosphoric acid, 0·15 per cent. ; potash, 2·10 per cent. Flax-waste compares very favourably in composition with stable manure, and has the additional advantage that it contains no weed-seeds. The percentage of nitrogen and potash is comparatively high. Since 1904 I have frequently recommended it as a substitute for farmyard manure.

At my instigation experiments undertaken at the State farms have demonstrated its value on potatoes, but it would probably be beneficial for any crop grown on a soil deficient in humus. It should be obtained in a well-rotted condition, and applied at same rate as dung—10–20 tons per acre.

[The general analyses of manures will be published in the *Journal* when available.—ED.]

SPRAYING FOR APHIS ON MELONS, ETC.

P. H. G., Rongotea, writes as follows :—

My gooseberry-trees die off more or less every year. I have not noticed any blight—the trees just seem to die without cause. Last year I had a great deal of trouble with a green aphis on water-melon and cucumber plants. It very much resembled the cabbage-aphis. What spray would you recommend for this blight ?

The Director of Orchards, Gardens, and Apiaries supplies the following reply :—

It is not possible to advise in the case of disease in gooseberry-trees without first ascertaining cause of failure. The correspondent should forward specimens for examination. For aphis on melons and cucumbers, the tobacco wash or kerosene emulsion is used, and applied with a good spray-pump. The directions for making are as follows :—

Tobacco Wash.—1 lb. strong tobacco or 3 lb. waste tobacco, 3 lb. soft soap, 20 gallons of water. In a closed vessel boil the tobacco and soft soap in 2 gallons of water for half an hour. Strain this into 18 gallons of water. The decoction of tobacco may be used without the soap. The best results in using tobacco wash are attained by application very early in the season, when the aphis first makes its appearance. At this period, when the growth attacked is exceedingly tender, it is advisable to use twice as much water as that given in the above formula, if necessary gradually increasing the strength of the wash as the season progresses and the growth of the plants hardens.

Kerosene Emulsion.—Kerosene, 2 gallons ; common soap, ½ lb. ; boiling water, 1 gallon. Place the soap in the water, which should by preference be rain-water. Hard water is unsuitable, but if only such is to be had, make it soft by adding some soda. Boil till the soap is thoroughly dissolved ; then take it off the fire and pour the solution into the kerosene ; thoroughly churn up with a syringe or in an old churn for ten or fifteen minutes. The emulsion should then, if perfect, form a cream which thickens on cooling without any appearance of free kerosene. For most plant-lice (aphides) and other soft-bodied insects, from 12 to 20 parts of water are added to 1 of the emulsion.

CUTWORMS.

C. B., Eketahuna, writes as follows :—

I am sending you per post three grubs which I wish you would have identified for me, and also a sample of their work. They eat through the haulm of the potato, which then withers and dies. At present I go round in the morning, and when I see a withered stalk I just remove a little of the earth, and nearly always find one of these grubs. I wish you could let me know if there is a better method of getting rid of them.

The Biologist replies,—

The specimens sent are the larvæ of one of the native cutworms belonging to the genus *Agrotis*. There are five species occurring in New Zealand, of which *Agrotis ypsilon* is the commonest, and does the largest amount of damage to both field and garden crops. The following methods will be found useful in controlling this class of insect in small gardens :—

The Poison Method.—This consists of killing off the grubs before the crops are planted, by strewing over the ground bunches of fresh clover, cabbage, or other leaves which have been dipped in a solution of arsenate of lead (1 lb. to 20 gallons of water). The young grubs in search of food greedily eat these baits, and are killed before they can do any harm. This method has given good results, and is well worth a trial where cutworms are likely to prove troublesome. Of course, care must be taken that fowls or stock do not get at the poisoned leaves.

Using Boards as Traps.—This method consists in placing boards on the ground in and about the garden, and collecting and destroying each morning the grubs that will congregate beneath them during the night.

Digging out the Grubs.—This consists of digging out the grubs that will be found round each affected plant.

SPECIMEN OF CLAY.

E. F., Kimbolton, writes,—

I am forwarding a small parcel of a kind of clay, and should be obliged if you could let me know what it is composed of. It was taken out of a bank of sand and gravel, and seems to me to be something out of the common.

The Agricultural Chemist replies :—

The specimen consists of impure kaolin, or China clay. It contains no lime or phosphoric acid, and would be of no value for agricultural purposes.

DRY-MASH OR WET-MASH FOR POULTRY.

AN experiment is now being conducted at the Burnham Poultry Station to determine the difference in results between dry mash and wet mash in egg-production with good laying birds. The eggs from a pen of birds all bred the same way were hatched by an incubator. Thirty-three pullets from these were selected, and kept under exactly the same conditions till they came on to lay. Twelve of the best were picked out as egg-producing type. These were equally divided, and put in two adjoining runs, exactly the same in every particular. Before beginning to take the records, the six birds to be fed on dry mash were fed on this food for six weeks, in order to get them accustomed to it. The records have been taken from 1st April last, and the test will conclude on 31st March next, and this will be the fairest and most thorough test yet made in regard to dry- *versus* moist-mash feeding.

INTERIM RETURNS OF FIELD CROPS, 1910-11.

THE following is an estimate of the area under certain crops on the 20th October, 1910 :--

WHEAT.

Area for Threshing.

Year.	Acres.
1910-11	274,533
1909-10	311,000
Decrease	36,467

OATS.

Area for Threshing.

Year.	Acres.
1910-11	353,997
1909-10	378,000
Decrease	24,003

BARLEY.

Area for Threshing.

Year.	Acres.
1910-11	32,969
1909-10	41,500
Decrease	8,531

MAIZE.

Area for Threshing.

Year.	Acres.
1910-11	9,613

PEAS.

Area for Threshing.

Year.	Acres.
1910-11	13,673

RYE-GRASS.

Area for Seed.

Year.	Acres.
1910-11	50,352
1909-10	56,550
Decrease	6,198

COCKSFOOT.

Area for Seed.

Year.	Acres.
1910-11	26,527
1909-10	29,500
Decrease	2,973

RED CLOVER.

Area for Seed.

Year.	Acres.
1910-11	4,822

WHITE CLOVER.

Area for Seed.

Year.	Acres.
1910-11	693

POTATOES.

Year.	Acres.
1910-11	30,050
1909-10	30,500
Decrease	450

TURNIPS.

Year.	Acres.
1910-11	508,596
1909-10	522,550
Decrease	13,954

MANGOLDS.

Year.	Acres.
1910-11	11,004

RAPE.

Year.	Acres.
1910-11	220,662
1909-10	225,035
Decrease	4,373

The area of oats grown for chaffing is probably larger than for the preceding two seasons, the Marlborough production being estimated at 7,000 acres to 8,000 acres. A considerable quantity, in localities affected by insufficient rain, intended for threshing has been used for chaff.

The areas of turnips and rape have been increased in some districts since the returns were collected by crops of these plants being sown on land which had been occupied by cereal crops fed off or harvested early owing to dry weather.

The dry season in the principal grain-growing districts had the effect of checking the development of the crops to such an extent that some were fed off by stock, and some ripened prematurely and were cut for chaff. The cocksfoot and rye-grass seed crops have also been greatly diminished by the same cause. The rains since the middle of November caused a great improvement in the remaining crops and the pastures.

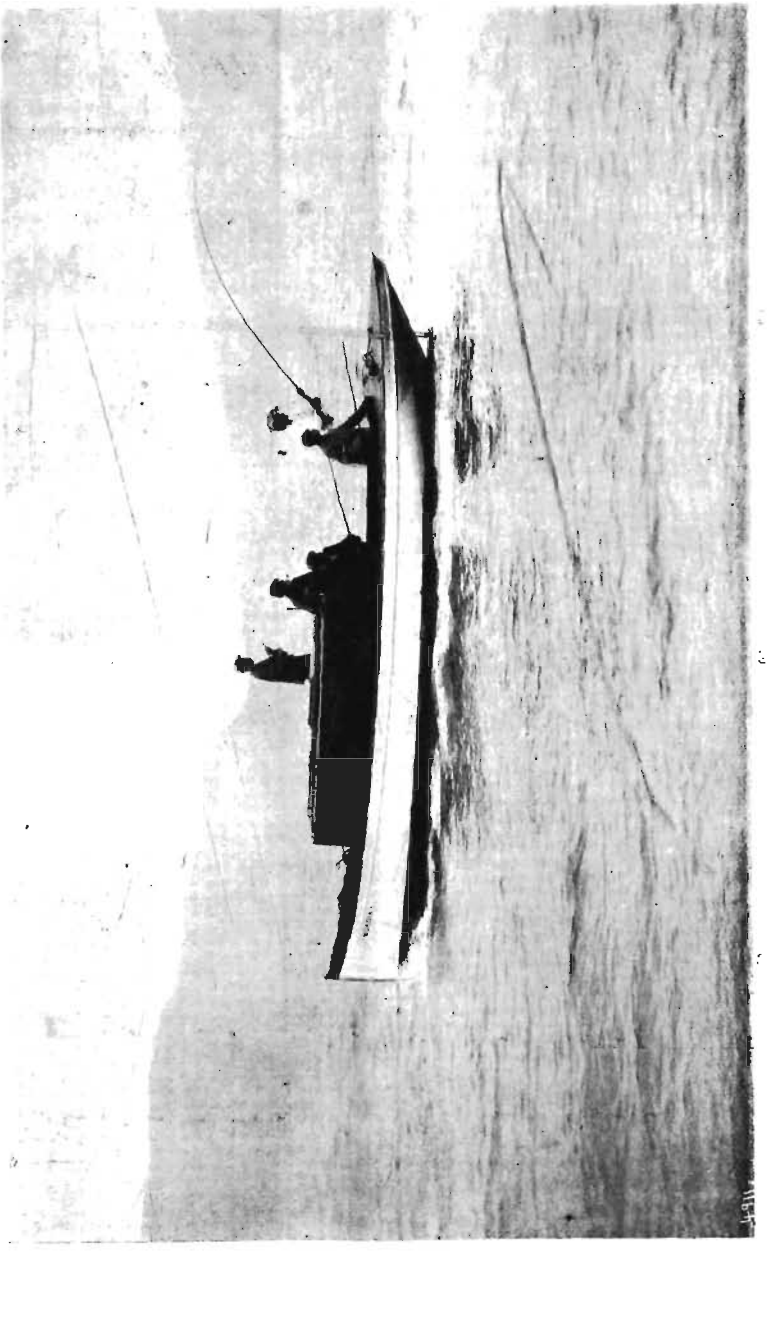
AREAS UNDER OR INTENDED TO BE SOWN WITH CERTAIN CROPS ON 20TH OCTOBER, 1910.

District.	For threshing only.					Intended to be cut for Seed.				Sown, or intended to be sown.			
	Wheat.	Oats.	Barley.	Maize.	Peas.	Rye-grass.	Cocksfoot.	Red Clover.	White Clover.	Potatoes.	Turnips.	Mangolds.	Rape.
	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.*
uckland—													
1910–11 ..	1,473	5,414	889	6,340	196	1,577	1,322	85	75	4,796	44,173	843	8,498
1909–10 ..	2,600	2,000	1,300	..	..	1,200	850	..	..	5,500	52,000	..	7,500
Iawke's Bay—													
1910–11 ..	973	7,796	1,535	2,786	101	4,766	1,026	25	100	1,857	15,314	483	24,692
1909–10 ..	1,000	8,000	3,000	..	..	6,000	700	..	..	2,000	16,000	..	25,000
'aranaki—													
1910–11 ..	1,000	4,000	1,500	200	100	200	700	..	..	1,000	18,000	1,700	4,500
1909–10 ..	1,000	3,500	1,200	..	..	150	250	..	..	600	18,000	..	4,500
Vellington—													
1910–11 ..	5,616	21,872	1,822	286	701	4,149	1,088	14	70	2,928	29,099	1,165	34,427
1909–10 ..	7,700	15,000	1,200	..	..	2,500	1,000	..	..	2,400	26,000	..	34,000
Iarlborough—													
1910–11	2,769	4,390	11,915	..	3,523	626	1,079	650	48	591	5,020	138	8,652
1909–10 ..	7,500	2,500	12,000	..	..	650	1,000	..	..	700	6,200	..	9,500
Ielson—													
1910–11 ..	1,200	3,000	2,000	..	500	50	500	50	25	900	6,000	150	2,000
1909–10 ..	1,200	3,000	3,000	..	..	50	500	..	..	900	6,000	..	2,000
Vestland—													
1910–11 ..	..	..	..	..	..	..	..	..	..	..	..	..	..
1909–10 ..	..	..	..	..	..	..	..	..	..	..	..	..	..
anterbury—													
1910–11 ..	191,113	136,898	7,795	1	8,167	9,209	19,196	3,603	289	8,250	148,045	3,429	93,516
1909–10 ..	210,000	170,000	14,800	..	..	14,000	25,000	..	..	9,000	155,000	..	102,500
'tago—													
1910–11 ..	70,389	170,627	5,513	..	385	29,775	1,616	395	86	9,728	242,945	3,096	44,377
1909–10 ..	80,000	173,000	5,000	..	..	32,000	200	..	..	9,400	245,000	..	40,000
otals—													
1910–11 ..	274,533	353,997	32,969	9,613	13,673	50,352	26,527	4,822	693	30,050	508,596	11,004	220,662
1909–10 ..	311,000	377,000	41,500	..	..	56,550	29,500	..	..	30,500	524,550	..	225,035

The Counties of Waiapu and Cook are included in the Hawke's Bay District. The Counties of Amuri and Cheviot are included in the Canter-

ESTIMATED YIELDS OF FIELD CROPS AS AT 31st DECEMBER, 1910.

District.	Wheat.	Oats.	Barley.	Maize.	Peas.	Rye-grass.	Cocks-foot.	Red Clover.	Potatoes.	Turnips.	Mangolds.
	Bushels per Acre.					Pounds per Acre.			Tons per Acre.		
Auckland	35·67	40·25	28·67	47·8	32	276	208	..	5·2	24·5	31·75
Hawke's Bay	30	34	31	29	20	440	160	..	9	19	25
Taranaki and Wellington	31	39	45	..	..	442	..	..	6	..	..
Nelson and Marlborough	37·3	34·7	26	..	25·5	588	75	184	6·6	17·2	19
Canterbury	28	33	35	..	..	..	168	..	..	..	..
Otago	30·18	38	25·63	..	26·6	370	203	..	6·31	17·06	22·13
Southland	31	41	30	..	30	522	247	..	7	17	26
Averages for the Dominion	28·8	36·2	30·3	41·4	25·55	413	167·66	184	6·4	18·19	24·05
Dominion averages for ten years, 1900–1 to 1909–10	31·39	39·44	34·5	50·34	32·01	505·2	184·05	..	5·84	..	..



[Iles, photo., Rotorua.

TROUT-FISHING AT ROTORUA: TROLLING ON THE LAKE.

HEMP AND TOW GRADING RETURNS.

DECEMBER, 1910.

Hemp.—The total number of bales of hemp graded by the Department during December was 13,233, as against 14,662 for the corresponding month of the previous year—a decrease of 1,429 bales.

For the twelve months ended 31st December, 1910, the number of bales graded was 126,814, as against 87,062 for the previous twelve months—an increase of 39,752 bales.

Tow.—During the month 4,328 bales were dealt with, as against 4,897 for the previous month -a decrease of 569 bales.

HEMP AND TOW GRADED THROUGHOUT THE DOMINION DURING DECEMBER, 1910.

Hemp.

Port.	Superior.	Fine.	Good Fair.	Fair.	Common.	Rejected.	Condemned.	Total.
	Bales.	Bales.	Bales.	Bales.	Bales.	Bales.	Bales.	Bales.
Auckland ..	..	2	1,147	719	206	..	23	2,097
Napier ..	..	..	37	..	..	..	..	37
Foxton ..	..	119	3,340	637	7	10	..	4,113
Wellington ..	..	157	3,217	1,562	200	..	..	5,136
Blenheim ..	..	..	108	9	..	..	..	117
Picton ..	12	88	52	60	7	..	..	219
Lyttelton ..	..	..	..	..	..	..	..	..
Dunedin ..	..	..	261	202	..	..	..	463
Bluff ..	..	..	187	716	133	15	..	1,051
Totals ..	12	366	8,349	3,905	553	25	23	13,233
Percentages of total	0·1	2·75	63·1	29·5	4·15	0·2	0·2	..

Tow.

Port.	First Grade.	Second Grade.	Third Grade.	Condemned.	Total.
	Bales.	Bales.	Bales.	Bales.	Bales.
Auckland ..	..	533	288	64	885
Napier	..	..	..	..	..
Foxton	423	468	65	..	956
Wellington ..	887	725	159	16	1,787
Blenheim ..	37	26	..	..	63
Picton	54	62	..	..	116
Lyttelton ..	..	..	..	..	..
Dunedin ..	..	52	81	..	133
Bluff	..	73	291	24	388
Totals ..	1,401	1,939	884	104	4,328

SHIPMENTS OF UNDERMENTIONED PRODUCE FROM NEW ZEALAND TO UNITED KINGDOM,

COMPILED FROM MANIFESTS OF VESSELS SAILED DURING RESPECTIVE MONTHS OF THE CURRENT AND PRECEDING SEASONS.

Month.		Mutton, Carcases.	Lamb, Carcases.	Beef, Quarters.	Butter, Boxes.	Cheese, Crates.	Wool, Bales.	Wheat, Sacks.	Oats, Sacks.	Rabbits, Crates.	Hemp, Bales.	Tow, Bales.	Kauri-gum, Cases.	Sundry.
October,	1910	49,010	800	10,531	60,014	9,159	3,189	94,815	23,330	36,947	3,632	1,232	3,089	56 carcases pork.
"	*1909*	*103,746*	*49,600*	*4,049*	*57,221*	*13,716*	*3,995*	..	*41,079*	*24,847*	*1,105*	*631*	*7,882*	..
November,	1910	62,926	29,877	5,554	105,759	27,749	55,551	76,594	331	28,646	6,850	2,300	4,339	911 carcases pork.
"	*1909*	*56,467*	*40,973*	*11,073*	*99,951*	*33,019*	*49,480*	..	*21,955*	*26,448*	*4,151*	*734*	*4,383*	..
December,	1910	82,405	157,172	13,155	182,051	67,162	59,030	..	..	9,716	4,524	109	5,363	686 carcases pork.
"	*1909*	*90,245*	*86,345*	*23,199*	*164,314*	*68,867*	*72,056*	..	*2,613*	*2,138*	*7,389*	*1,618*	*8,742*	..
January,	1910	86,491	252,193	22,527	87,934	39,717	122,399	2,391	15,839	1,634	11,305	4,704	5,682	..
"	*1909*	*146,794*	*287,244*	*14,344*	*95,593*	*52,568*	*123,871*	..	..	..	*5,846*	*1,757*	*5,188*	..
February,	1910	196,093	414,408	23,798	97,766	62,192	102,182	4,724	8,600	..	4,223	2,314	4,827	1,719 carcases pork.
"	*1909*	*237,681*	*300,018*	*24,214*	*81,232*	*38,410*	*66,494*	*439*	*9,921*	..	*4,383*	*985*	*7,982*	..
March,	1910	222,058	413,179	22,134	77,319	42,029	64,266	2,809	3,636	..	9,152	2,490	2,959	793 carcases pork.
"	*1909*	*215,793*	*406,982*	*22,031*	*43,235*	*31,271*	*85,994*	*5,421*	*16,858*	..	*4,955*	*1,447*	*8,107*	..
April,	1910	209,120	559,166	29,355	46,524	44,032	32,920	21,855	1,934	12	10,179	2,951	4,250	627 carcases pork.
"	*1909*	*281,412*	*525,211*	*19,511*	*21,783*	*29,164*	*27,468*	*15,051*	*16,975*	..	*5,910*	*786*	*580*	..
May,	1910	310,196	622,232	38,276	9,588	28,384	25,123	81,052	..	3,010	10,017	2,346	3,150	1,293 carcases pork.
"	*1909*	*261,886*	*675,070*	*39,961*	*4,307*	*17,508*	*39,259*	*135,346*	*139,297*	*3,500*	*6,171*	*972*	*2,473*	..
June,	1910	299,596	555,777	60,286	485	17,963	21,260	13,707	..	8,983	6,180	2,681	7,104	658 carcases pork.
"	*1909*	*108,094*	*302,721*	*29,029*	*66*	*12,406*	*12,157*	*88,974*	*223,563*	*3,500*	*1,768*	*790*	*3,762*	..
July,	1910	219,906	334,753	71,160	..	595	12,816	20,604	1,106	8,649	6,695	1,437	8,272	2,448 carcases pork.
"	*1909*	*164,437*	*231,053*	*31,929*	*1,479*	*3,650*	*22,471*	*77,909*	*170,701*	*5,473*	*4,429*	*633*	*10,260*	..
August,	1910	94,468	97,899	16,440	634	..	5,381	33,970	273	22,629	1,378	720	6,793	362 carcases pork.
"	*1909*	*63,219*	*117,316*	*41,029*	*3,601*	*1,721*	*6,575*	*27,207*	*234,998*	*9,149*	*2,348*	*1,286*	*887*	..
September,	1910	104,925	26,416	8,420	22,644	41	5,539	40,876	3,863	7,721	2,680	597	1,682	255 carcases pork.
"	*1909*	*70,815*	*73,827*	*22,272*	*9,886*	*974*	*6,575*	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	

THE BRITISH PRODUCE-MARKET.

HIGH COMMISSIONER'S CABLED REPORTS.

THE following are cabled market reports received by the Department from the High Commissioner, London, during the monthly period prior to publication of the *Journal*. Unless otherwise specified, the prices quoted are average market prices on spot at date of message. Grain is *ex* granary on spot.

10th December, 1910.

Mutton.—The market is quiet. Stocks of New Zealand on hand are light. The market has been unfavourably affected by the stocks of Argentine on hand, which are heavy and widely distributed amongst agents, who are pushing sales. Canterbury $4\frac{1}{8}$d., North Island $3\frac{7}{8}$d., River Plate, 3d., per lb.

Lamb.—The market is firm, but there is every reason to expect a decline. Large shipments are arriving. Australian $5\frac{3}{8}$d. per lb.

Beef.—The market is weak and inactive. New Zealand hind quarters $3\frac{1}{4}$d., fore quarters $2\frac{5}{8}$d., per lb.

Butter.—The market is becoming more depressed on account of the rapid increase of arrivals. There is less demand. The shipment of butter and cheese per "Tongariro" arrived in good condition. New Zealand choicest 109s., Danish 117s., Siberian 103s., Australian 104s., Argentine 106s., per cwt.

Cheese.—The market is firm, especially for coloured, the supply of which falls short of the demand. New Zealand finest coloured 57s., white 56s., per cwt.

Hemp.—The market is very depressed, and there is little demand. New Zealand good fair £22, fair £20 10s., Manila fair current £19 10s., per ton. Forward-shipment prices are about the same. The output from Manila for the week was 20,000 bales.

Arrivals of River Plate Mutton and Lamb.—The following shipments were received from the River Plate at United Kingdom ports during November, 1910:—

	Mutton. Carcases.	Lamb. Carcases.
London	113,729	12,021
Liverpool	227,097	7,981
Hull	12,041	184
Cardiff	18,903	106
Total	571,770	20,292

17th December, 1910.

Mutton.—There has been no alteration in the market since last week.

Lamb.—The market is weakening, with signs of a decline. Buyers are not inclined to make forward purchases at present prices. Australian, $5\frac{1}{4}$d. per lb.

Beef.—The market is dull. Stocks of New Zealand on hand are light; supplies of River Plate are heavy. New Zealand hind quarters $3\frac{1}{4}$d., fore quarters $2\frac{3}{4}$d., per lb.

Butter.—The market is dull. Buyers are holding back expecting prices to go lower on account of the large supply; holders are anxious; New Zealand choicest 106s., Australian 100s., Argentine 102s., Danish 116s., Siberian 101s., per cwt.

Cheese.—The market is quiet, but holders are firm. New Zealand finest white 56s., coloured 57s., per cwt.

Eggs.—The spot market is strong for new-laid, but there is less demand for cold-stored. Russian 7s. 6d. to 10s. 3d., Italian 14s. 6d. to 16s. 6d., Danish 19s to 20s. 6d., per 120.

Poultry.—There is a general and active demand. Cold-stored: American chickens 9d. to 10d., Russian 8d. to 9d., turkeys 7d. to 8d., ducklings 6d. to $7\frac{1}{2}$d., per lb.

Cocksfoot-seed.—Buyers are not keen to do business, but holders are firm.

Wool.—The market is a shade weaker. Bradford tops: 36's (low crossbreds) 1s. $1\frac{1}{4}$d., 40's (low crossbreds) 1s. $2\frac{1}{4}$d., 44's (medium crossbreds) 1s. $3\frac{3}{4}$d., 50's (half-breds) 1s. $7\frac{1}{4}$d., 56's (quarter-breds) 1s. $10\frac{1}{4}$d., 60's (merinos) 2s. 2d.

Hemp.—The market is dull, with a downward tendency. New Zealand good fair £21 10s., fair £20 10s., Manila fair current £19 10s., per ton. January–March shipment: Good fair £21, fair £20 5s., Manila £19 10s., per ton. The output from Manila for the week was 23,000 bales.

24th December, 1910.

Mutton.—The market is quiet, with no alteration in prices.

Lamb.—The market is weak and inactive.

Beef.—The market is steady, with an improved demand. New Zealand hind quarters 3⅜d., fore quarters 2⅞d. per pound.

Butter.—The market is lifeless. New Zealand choicest 104s., Australian 98s., Danish 114s., per cwt.

Cheese.—The market is very quiet; there is nothing doing. New Zealand finest white 56s., coloured 57s., per cwt.

Hemp.—The market is very depressed, and has declined further. The output from Manila for the week was 27,000 bales.

The markets generally are quiet on account of the Christmas holidays.

31st December, 1910.

Mutton.—The market is quiet. The New Zealand supply is running short, especially Canterbury. Trade is very disappointing, there being only a very hand-to-mouth demand. Canterbury 4½d., North Island 4¼d., per lb. Quotations are nominal.

Lamb.—The market is steady, and there is a good demand for prime quality. Australian is in large supply. New Zealand other than Canterbury 5⅞d. nominal, Australian 5d., per lb.

Beef.—There is a better demand. New Zealand hind quarters 3½d., fore quarters 2⅞d., per lb.

Butter.—The market is quiet, but rather steadier. There are heavy supplies on hand. New Zealand choicest 104s., Australian 98s., Danish 112s., Siberian 98s., per cwt.

Cheese.—The market is quiet, but steady. New Zealand white 55s. 6d., coloured 57s., per cwt.

Wool.—The market is rather quiet. Bradford quotations for tops are as follows: 36's (low crossbreds) 1s. 1¼d., 40's (low crossbreds) 1/2¼d., 44's (medium crossbreds) 1s. 3d., 50's (half-breds) 1s. 7d., 56's (quarter-breds) 1s. 10¼d., 60's (merinos) 2s. 2d.

Hemp.—The market is lifeless, owing to a poor demand. New Zealand good fair £20, fair £19 15s., per ton. Forward shipment about the same. The output from Manila for the week was 36,000 bales.

7th January, 1911.

Mutton.—The market is quiet. Stocks of New Zealand on hand are light, and are firmly held in few hands; River Plate mutton is in large supply. Canterbury 4½d., North Island 4¼d., River Plate 3¼d., Australian 3⅜d., per lb.

Lamb.—The market is weakening, with signs of a decline. Large shipments are arriving, and buyers are cautious. Only a few new season's New Zealands have been received, and these have realized 6¦d. per lb., Australian 4¾d.

Beef.—The market is steady, and there is a fair business doing. New Zealand hind quarters 3½d., fore quarters 2⅞d., per lb.

Butter.—There is a better demand. The low prices have induced speculative buying to hold in store. There are heavy supplies on hand. Imports of colonial for December were 412,346 boxes, as against 235,704 last year. Buyers are cautious. New Zealand choicest 106s., Australian 102s., Danish 114s., Argentine 104s., per cwt.

Cheese.—The market is firm, and there is more demand. New Zealand white 56s., coloured 57s. 6d., per cwt.

Cocksfoot-seed.—The market is steady, and holders are firm, but buyers are not keen to do business. New Zealand bright clean 17 lb. seed 74s. per cwt.

Wheat.—The market is quiet, but rather steadier. New Zealand long berried per quarter of 496 lb. 33s. 6d., short berried 33s.

Oats.—The market is quiet and small business doing, except for best quality only. New Zealand short oats, per quarter of 384 lb., 18s. 6d.; New Zealand Danish, per quarter of 320 lb., 16s. 9d.

Beans.—There is a general and active demand and a small supply. New Zealand f.a.q. (old crop), per 504 lb., 35s.

Peas.—The market is firm, with more inquiry. New Zealand partridge, per 504 lb., 46s.

Eggs.—The market is weaker, with a downward tendency, and supplies are likely to increase. Cold-stored Russian 7s. to 9s. 6d., Italian 10s. 3d. to 14s. 6d., Danish 12s. 5d. to 17s., per 120.

Poultry.—There is a good demand for all descriptions. Chickens: American 8d. to 9d., Russian 7½d. to 8½d., per lb.; ducklings 6d. to 7d. per lb.

Wool.—The market is quiet but steady.

Hemp.—The market remains very depressed. A moderate business has been done at lowest prices. New Zealand good fair £20 5s., fair £20, Manila fair current £19, per ton. Forward shipment: Good fair £20 5s., fair £19 15s., Manila £19 10s., per ton. The output from Manila for the week was 26,000 bales.

Arrivals of River Plate Mutton and Lamb.—The following shipments were received during December:—

	Mutton. Carcases.	Lamb. Carcases.
London	76,208	17,091
Liverpool	127,263	41,650
Hull	8,000	..
Southampton	12,046	4,516
Cardiff	3,705	..
Bristol	12,345	..

SHIPMENTS TO UNITED KINGDOM FROM ARGENTINA.

THE Department has received the following cablegram from Buenos Aires, dated 4th January, 1911:—

The following shipments of produce were despatched from the Argentine to United Kingdom ports during December, 1910 (compared with figures for December, 1909):—

	1910.	1909.
Frozen beef (quarters)	57,319	160,335
Chilled beef (quarters)	154,685	116,893
Frozen mutton (carcases)	150,254	165,000
,, lamb (carcases)	95,661	34,075
Butter (cwt.)	5,340	9,439

CO-OPERATIVE EXPERIMENTS.

THE Department co-operates with farmers who desire to carry out crop experiments—both variety and manurial—on their farms.

The Department will supply the seed and manure, and will design and supervise the experiments; while the farmer provides the land and labour, and retains the crop.

The area of each plot is usually limited to from one-tenth to one-fifth of an acre.

Further information can be obtained from—

THE DIRECTOR OF FIELDS AND EXPERIMENTAL FARMS,
DEPT. OF AGRICULTURE, COMMERCE, AND TOURISTS,
WELLINGTON.